

# The Iron Age

A Review of the Hardware and Metal Trades.

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## Medieval Wrought Iron Work.

Ornamental work in wrought iron has for many years been greatly neglected by both artists, artisans and the decorators. Where iron is to be used in ornamental work it is almost always cast, so that people seem to have forgotten entirely the capabilities of wrought iron for decorative purposes. In the middle ages the value of wrought iron ornaments was highly appreciated; great ability was displayed in its management, and the results attained were often of extraordinary beauty. Our cut represents a wrought iron grating intended for a window lattice. It is from a house in Ratisbon, Bavaria. While it is by no means an example of the best medieval work, still it is a very interesting example of a style of workmanship which deserves to be revived. In the treatment of the spirals, or volutes, the workman fell into error of making them regular spirals instead of geometric, as it might be termed. This robs the design somewhat of its beauty. By the use of both round and square iron, variety is obtained in the tracery. The leaves and rosettes are of plate lined by the hammer, but not raised or embossed. The spirals, which are so effective, are easily produced and are beautifully proportioned. In looking over the whole grating, it will be seen that the means used to produce a given effect are always simple, and in most cases easy. The molded bands, for example, which are so effective, seem to be made with a broad flat band clasped outside with a half-round strap, the whole giving the effect of a molding, which, in the solid, would be somewhat difficult to obtain except at the expense of a good deal of swedging.

Blacksmithing as a fine art seems to have almost entirely disappeared, and now the reproduction of any of the old work is a matter of no little difficulty. The growing taste for work of this kind is an encouraging sign, and we may expect before long to find it as common, and perhaps as good, as it was some centuries since. A great deal of the scroll and decorative iron work which we are now in the habit of seeing cast was then worked up in sheet metal. Some of the ancient work seems to be a combination of cast and wrought iron, the metal having been malleable and then finished by forging. Great use was made of leafage struck up, while hot, from sheets or plates, and then the ends curled, or twisted, so as to develop the leaf.

For brackets, railings, gates, and for many other uses outdoors, where strength and beauty are both desirable, wrought iron is the only metal which seems in any way to meet all the requirements of the case. It twists, bends, spreads out beneath the hammer, is quickly and easily worked, and, above all, is strong and unyielding when cold. Such a material will not be long out of fashion, and we are glad to notice that in some of the best buildings put up in the city within the last year or two, the architects have begun to appreciate the value of the material, and have used it both well and liberally in the exterior decorations.

## The Dexter Carriage Spring.

In the best carriage building practice of the time, the platform spring has superseded the

spring is rigidly attached to each other at their centers, and are pivoted at their ends to spring links above or on either side of axle and spring bar. The spring links are rigidly attached to the head block and rear axle respectively.

The parallel motion of the springs prevents rocking of the axles. One spring being above the other prevents side motion and the settling

at the Centennial, sustaining a load of over 1100 pounds.

## Submarine Operations.

Among the most interesting, because surmounted with such a semi-mystery, are the operations connected with works under water. A diver descends—he does not dive head-fore-

marine work in the Eastern States are George W. Townsend & Co., 214 Atlantic avenue, Boston, all the members of the concern being practical divers of long experience. The Boston Journal of Commerce gives the following account of the operations upon which they are engaged at present: They are laying the heavy sea-wall on South Boston Flats in 33 feet of water at high tide, and 23 feet at low

and a powerful derrick capable of raising ten tons, air engines for supplying the divers, and a drilling apparatus consisting of a steam drill erected on a tripod 35 feet high, with extension legs to allow for inequalities of the bottom; a shaft is run from the drill to the bottom of the tripod, to which is attached the drill point. The steam for working the drill is furnished from the sloop through a flexible rubber pipe. The diver descends, locates the holes, replaces drill points, etc. About a dozen holes are drilled about 3 feet apart, and from 3 to 5 feet deep. When in readiness for blasting the drill and tripod are taken up by the sloop and removed to a convenient distance. Different kinds of explosives are used, according to the nature of the blast, as nitro-glycerine, rend-rock, vulcan powder, Dualin and common powder. The explosive is put into tin cartridges just fitting the holes made by the drill, about 3 inches in diameter, and varying in length from 2 to 4 feet; an electric exploder is then inserted in each one, and gutta percha insulating wire connected with each cartridge. The holes are cleared thoroughly from all sediment and chips caused by working the drill by forcing a powerful stream of water to the bottom of each; the cartridges are inserted, the wires connected, the vessel hauled off a sufficient distance, and the charge is exploded. The debris is then taken up, the large pieces hoisted on board by chains, the smaller ones by tubs, and all removed ashore.

They are also operating on the wreck of the steamer Oriental. They have removed all the cargo on a percentage for the underwriters, and have blown the hull to pieces, and are now engaged in saving that and the machinery piecemeal. Captain Eugene Sullivan, a member of the concern, with the sloop Stella, and a competent force of men, are engaged on this job, and as it is in a very exposed situation great care and experience are necessarily required to work with profit and safety. In Bangor operations are being carried on under the personal supervision of Captain E. A. Bailey, another member of the concern, and consist in the removal of the Green Pier Ledge. At Lanesville, near Rockport, they are engaged in rebuilding the breakwater, which was overthrown by the force of the waves. They have also recently surveyed the channel at Hingham for the Steamboat Company and removed a number of rocks and obstructions. Among other operations in this harbor have been the removal of Kelley's Ledge, Corwin Rock and Tower Rock in the main channel, and Barrel Rock in Broad Sound. This last obstruction was a singular one. It resembled an immense egg on its small end, the water all around was quite deep, and while all the ledges in the harbor are composed of slate, this boulder was pure granite; surely it never grew there, and the only reasonable theory is that it must have been deposited there in some remote period from some iceberg or glacier.

**Steel Hawseers**—The introduction of large ships of war has rendered the old-fashioned hawseers comparatively useless. It is found impossible for men to handle larger cables and hawseers than are used for 6000 ton vessels. For this reason some new experiments have been made with steel

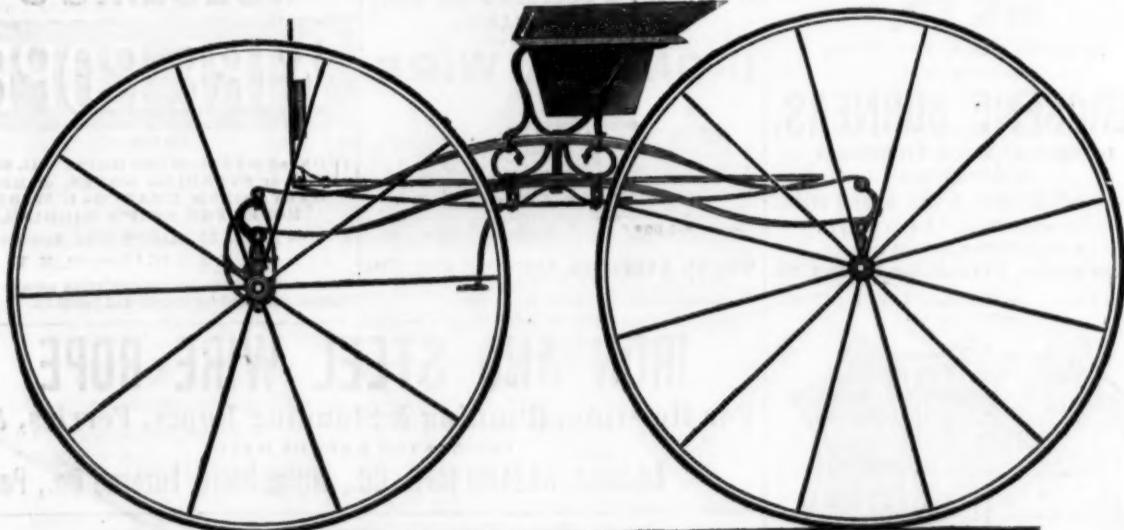


MEDIEVAL WINDOW GRATING AT RATISBON, BAVARIA.

of the body to one side. The absence of a reach allows either wheel to pass over an obstruction almost independently of the other wheels, especially when driving rapidly. The elasticity of the springs takes much strain off the fifth wheel, and cushions the stroke when striking an obstruction. No extra braces are needed to hold the wheels in track, since every strain tending to throw the wheels out of track

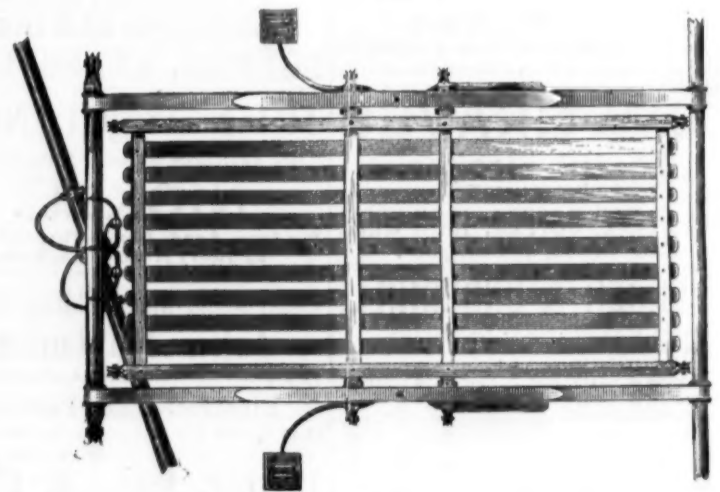
most as some may suppose, but simply sinks out of sight, and nothing is seen of him perhaps for hours; the pumps are kept moving, an attendant stands on the deck of the vessel holding the "life line" by which communication is kept up, and a little train of bubbles constantly arising to the surface, designating the position of the diver, are all the spectator can see, while the operations below are known

tide. The bottom has to be perfectly levelled off by the diver to correspond to a system of guide planks spiked on to spiles driven in position, placed at the requisite depth, and levelled by spirit level. The cut dimension stone is then laid in regular courses of headers and stretchers, breaking joints everywhere. This stone is laid at the rate of sometimes 100 tons per day. The air for the divers is supplied by a



Elevation.

THE DEXTER CARRIAGE SPRING.



Plan.

elliptic in heavy vehicles, while for light service preference is given to the side spring in its various forms. It is now conceded that the side spring has the most pleasant and undulating motion, as, being in the line of the motion of the vehicle, it relieves the rider of the quick jerks communicated by the elliptic.

Among the latest forms of the side springs is the Dexter, which we illustrate on this page. This spring consists essentially of two "Concord" or side springs upon each side, one spring above the other and parallel to it. The two

comes upon the slatted frame, or body, in a direction diagonal to its length—the strongest direction possible.

The manufacture of the Dexter spring was begun a year since by the Dexter Spring Company, of Hutton, a suburb of Pittsburgh, Pa., since which time they have sold over 700 sets, some 500 of which are in use, giving great satisfaction. Not a single spring of the Dexter make has been reported broken or settled. One two-passenger spring has carried 2050 pounds, and is now shown in the Main Building

only to the one making them, and sometimes his experience is very singular. In this latitude the diver seldom sees any fish of consequence beyond those familiar to us in the fish stores, but in more southern latitudes a man has need of all the courage he is master of at times to pursue his avocation without fear of attack; and yet the fish which is man's most mortal enemy under ordinary circumstances, the man-eating shark, is the veriest coward before a diver in a submarine armor.

Among the principal contractors for sub-

patent steam pump of new design and original with this concern. This job is expected to be finished—in all 1000 feet—this season. On the Upper Middle in the harbor channel operations are being conducted under supervision of Gen. Thom of the U. S. Engineer Corps, in charge of the improvements in Boston Harbor. The ledge is of a slaty formation, very difficult to blast, and the location a difficult one to work in on account of the force of the current, especially during the spring tides. The requisites for the work are a sloop containing a steam engine,

hawseers at Devonport under the authority of the British government. The steel hawser used was 8 inches in circumference against a hemp one 25 inches in circumference. The report as to handiness in working was entirely in favor of the steel wire hawser. Another great consideration is that 120 fathoms of 24 inches hemp cable weighs 7 tons 16 cwt., while the same number of fathoms of 8 inch wire cable, which is equal to, if it does not exceed, the strength of the others, weighs only 2½ tons. The wire rope which was tested is equal in strength to a 2½ inch chain, the weight of which would be 16 tons.

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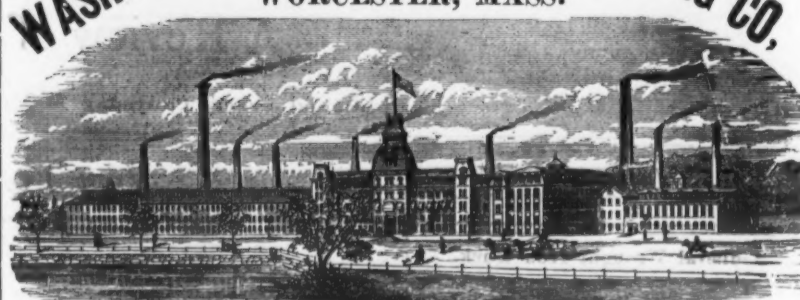
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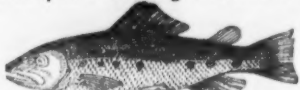
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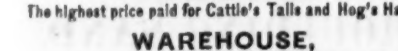
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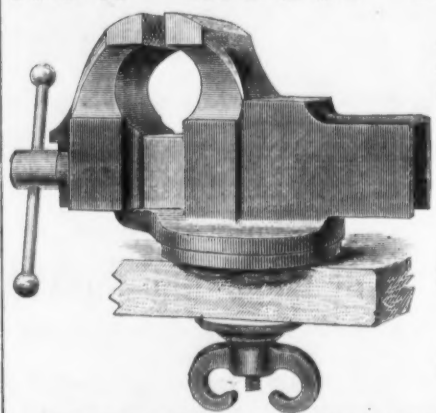
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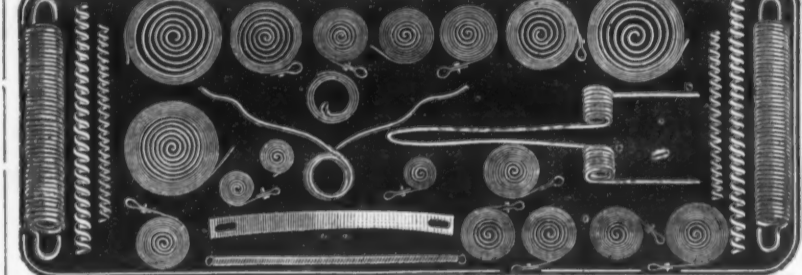
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Our Vises are warranted to do more work than any other make. No broken boxes or screws.

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Market Steel Wire, Crinoline Wire, tempered and covered.

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## The Faultless Fruit Can.

PATENTED.

The perfection of this article, in all of the essential points of a good fruit can, has been thoroughly demonstrated by the immense number sold. The demand increases, but with largely increased facilities we shall be able to meet the wants of the trade. As the can tapers slightly when made up, they nest together, thus saving space greatly. The opening is the full size of the top of the can, admitting of perfect cleansing and drying; and so making them much more durable.

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Another important feature is the labeling device, whereby the contents of the can, date, and method of preserving are easily shown. We furnish the complete trimmings for the FAULTLESS CAN, including the body all ready for soldering, at the following very low prices, viz:

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Cans made up ready for use:

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We would caution dealers against an imitation of our can having a "well" or "dead" near the top to prevent the cans sticking together when nested, as this feature is covered by our Patents.

The Trade only supplied.

Use good Sealing Wax for this, and all other cans, to secure good results.

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72, 74 & 76 Lake Street, CHICAGO.

## SCHIERLOH MFG. COMPANY,

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AWARDED NOV. 21, 1874.

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This compound is put up and warranted genuine only in 1, 5, 10, 50 and 100 lb.

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It is also for sale in 1, 5 and 10 lb. packages by Hardware Dealers generally throughout the country.

## PERFECT COMBUSTION BY AN OXYGEN BLAST.

By this process oxygen is imparted to the blast, simply by its passage, on its way to the place of combustion, through a chamber or vessel holding an oxygen compound, from which, by the agitation of the air thereon, oxygen is set free and thus imparted to the blast. The required volume of this blast is one-half less. The combustion becomes perfect therefrom, all the carbon in the fuel being converted into a high and concentrated heat, without smoke or gas, but of carbonic acid, being formed. Beside a saving of fuel, obtainable in all cases by this blast, advantages arise from its varying according to the appliance of the heat. On Forge Fires it gives a clean and intense heat, free from all sulphurous gas, whereby a better and quicker welding is had and time saved. On fires under boilers for making steam, the saving in fuel is 25 per cent. and over, the working capacity can be increased in same ratio by reason of the intensified and accelerated combustion, which latter also overcomes the disadvantages connected with the use of fine dust and impure coal. Castings from a cupola in which the fire is sustained by this blast become of superior quality, uniformly soft to work and very tough, resembling wrought iron and steel, they forge hot and cold to some extent; the iron becomes stronger and purer, being freed from carbon and sulphur. For blast furnaces this process becomes of vast importance—it saves fuel, increases the working capacity, perfects and reduces the cost of the metal, makes sulphurous and other impure ores fit for use. The serious drawbacks arising from an imperfect combustion, caused mainly by otherwise uncontrollable atmospheric influences, are overcome. The work of a puddling furnace and that of decarbonizing the iron, both for wrought iron and steel purposes generally, is much simplified, shortened and perfected as to purity of product; the work of so many hours is reduced to as many minutes by this process. The process has the merit of being simple and easily applied, and with but very little expense, and this only for the needed chamber or vessel and its connection with the blast pipe; the vessel may be a wooden keg, barrel or larger oak or tank, properly lined, from two gallons for a single forge fire up to 50 gallons and over, according to the blast in use. The cost of the oxygen is conditioned by, and made subject to, its effect—it is but a small item compared to the gases from it. Although this process has been in practical use for over a year, the inventor feels reluctant to offer it to the public before having its utility and practicability fully established, beyond any and all contingencies, not from a theoretical standpoint, but from the testimony of manufacturers who have used the process this last year, and whose standing and reputation as manufacturers are of the highest order, and such as to entitle them to the consideration of others. For further information, and for small specimens of castings from this process, address

**CHAS. HORNBOSTEL, 56 Broadway, Room 26, N. Y.**

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OFFICE, 51 Canal Street, Providence, R. I. WORKS at Valley Falls, R. I.

Manufacturers of

PERKINS and RHODE ISLAND PATTERNS of

**HORSE AND MULE SHOES.**

## Early Methods of Transportation.

The colonists, at the time they declared themselves to be an independent nation, occupied a narrow belt of country stretching nearly two thousand miles along the coast, from New Brunswick, a province of Great Britain, to Florida, then subject to the crown of Spain. A small portion of this population only was distant more than a day's journey from navigable tide waters.

As the waters of the Atlantic approached in Virginia more nearly than in any other State the navigable waters of the Mississippi, and as the settlements in it at the outbreak of the Revolution had penetrated further inland than in any other, it was natural that the routes of the Potomac or the James River should first attract attention; and it is a striking coincidence that the man who was pre-eminently the Father of his Country, considered as a nation, should also be the father of the system of artificial highways which in one form or another has spread itself as a vast network over the whole Continent, and has become a distinguishing feature of our civilization. From his early employment as surveyor of lands, Washington became more familiar than any other of his time with the region lying at the headwaters of the Potomac. In all his explorations the subject of a navigable water line from the Chesapeake to the Ohio constantly occupied his thoughts.

At the close of the war Washington again resumed the subject that engrossed so much of his attention, and was instrumental in procuring a charter for his proposed work from the States of Virginia and Maryland. He became president of the company that was formed, and secured to it valuable grants both in lands and money. He again crossed the mountains for the purpose of making a more careful examination of the country and the practicability of his enterprise. On his return he presented to the Governor of Virginia the results of his observations, in one of the most able and sagacious papers that ever came from his pen.

As Washington soon after was elected President of the United States, the enterprises which he urged with so much intelligence and persistence were abandoned, to be resumed at a distant day, but under conditions which rendered their accomplishment and the results predicted of them wholly unattainable. It is to be remembered, although at the period of which we are speaking canals were regarded as affording the best and cheapest means of inland communication, yet, for the first fifty years after the Declaration of Independence to great work of the kind was attempted, either for the want of adequate means, or of some crowning necessity, or of some scheme calculated to enlist a sufficiently powerful influence in its favor, the only routes in use were with very few exceptions the old ordinary highways. Upon the primitive soils of New England these served pretty well as means of transportation; but in all other parts of the country they were wholly inadequate for such purpose. The cost, according to the report of a committee appointed by the Legislature of the State of New York to consider the subject of the Erie Canal, of transporting a ton of wheat from Buffalo to New York, was \$100, and the time required 20 days. Such cost, which is now more than double the value of a ton of wheat in the city of New York, shows how unproductive must have been the labor of the greater portion of our population. Although the Western States at this time had received a large number of immigrants, their industry sufficed for hardly any other purpose than to supply their own necessities in food and clothing.

On April 15th, 1817, an act was passed by the Legislature of the State of New York making provision for the construction of the Erie Canal. On the 26th of October, 1825, the first boat reached tidewater from Lake Erie. On the 4th of November of that year, the completion of the work was celebrated with every demonstration that could give emphasis to the occasion.

Although the Erie Canal was formally opened in 1825, no considerable amount of tonnage was transported over it till 1826, so that the great revolution in the commerce of the country properly dates from the year which marks the beginning of the second half century of our national life. Up to that year the best methods of transportation on land were those in use at the very dawn of civilization. Fifty years ago the emigrant going West moved with his family and herds precisely as did his ancestors in the Old World 2000 years ago.

The opening of the canal almost instantly gave an impulse, wholly unprecedented, to the construction of similar works. The States of Pennsylvania, Maryland, Virginia, Ohio, Indiana and Illinois at once embarked upon elaborate systems designed to give to almost every portion of their respective territories the advantages of canal navigation. The State of Ohio constructed two lines across its territory from Lake Erie to the Ohio River, one extending from Cleveland to Portsmouth, the other from Toledo to Cincinnati. Indiana constructed an immense line extending from Toledo to Evansville, on the Ohio River. Illinois constructed one from Lake Michigan, at Chicago, to the navigable waters of the Illinois River. Pennsylvania undertook the construction of a canal from the Delaware to the Ohio River at Pittsburgh, but was compelled, for want of water at the summit, to supplement the mountain portion by a railroad of about forty miles in length. Maryland was able to push its great work, the Chesapeake and Ohio Canal, no farther than the base of the mountains at Cumberland. The favorite work of Virginia, the James River and Kanawha Canal, was carried only to the base of the same range. In the meantime, a large extent of line was

constructed by private corporations, so that within fifteen years from the opening of the Erie, 8500 miles of canal were constructed in various parts of the Union, chiefly in the States of New York, New Jersey, Pennsylvania, Maryland and Virginia. Of those constructed by the States, only the Erie, and perhaps the Champlain, have proved remunerative upon their cost.—*Foor's Railroad Manual.*

## The Officers of Machinery Hall, Centennial Exhibition.

The following list will be found convenient for reference by exhibitors in Machinery Hall: John S. Albert—Chief of Bureau of Machinery Hall.

Nahum Stetson—Secretary.  
J. G. Sanderson—Volunteer aid.  
Friedrich Ungever—Volunteer aid.  
Lewis W. Robinson—Superintendent in charge of office.

Henry Fourfax—Engineer.  
Joseph Hirst—Superintendent in charge of Machinery Building.

G. H. Woods—Engineer in charge of south-east section of Machinery Building.  
Wilson K. Furs—Engineer in charge of northwest section of Machinery Building.

George H. Hubbard—Engineer in charge of southwest section Machinery Building.  
Philip Vorhee—Engineer in charge of north-east section of Machinery Building.

John Cotter—Engineer in charge of hydraulic annex.

James L. Hodson—Engineer in charge of shafting.  
John T. Hawkins—Superintendent in charge of all buildings south of but connected with Machinery Hall.

Philip Pistor—Engineer of the same.  
William A. Dripps—Superintendent of all buildings west of but connected with Machinery Hall.

John D. Curtis—Engineer of the same.  
L. D. Norton—Superintendent in charge of all boilers and steam pipes.

J. C. Kilgore—Engineer of the same.  
W. E. Plummer—Superintendent of Shoe and Leather Building.

## Coking Colorado Coals.—The Colorado

*Farmer* says: Some few weeks ago we had occasion to write a few words about the probable success of the manufacture of coke in Colorado, saying the successful consummation of such an industry would be the opening of a new and brighter era in the history of Colorado than had yet dawned upon her. To-day we can announce to the people of our Territory the most flattering result from the use of the coke manufactured by Mr. N. P. Gutliens of the El Moro Coal and Coke Company. Ensinger & Davis, of the West Denver Iron and Brass Foundry and Boiler Works, have used two blasts of this coke in their works, and pronounce it fully equal in every respect to the best Pennsylvania coke. They have used an equal amount of coke to the one hundred pounds of metal and the results are entirely satisfactory. These experiments settle this matter at once and forever. Colorado has now attained that which if properly utilized will place her in the front ranks of manufacturing States. We have raw ores of every kind, and we have the fuel that is required to smelt them to make them valuable to commerce. We need no longer be dependent upon the East for the finishing touches that make our ores valuable. Our lead, copper, iron, silver and gold ores can now be refined here, so as the need of a cheap fuel for the reduction and manufacture is necessary, and we need have no fear for the future of Colorado, if our business men and capitalists, will only give their attention to the application of our resources. Two such works as could be mentioned by the score in Pittsburgh would do more for the material prosperity of Denver than anything that has been done for her for years. The agricultural and pastoral industries will also be greatly benefited by this discovery, and the *Farmer* is only too happy too have the opportunity of announcing such cheering and desirable information to our readers.

## A Historic Hammer—There is a hammer

at the undertaking establishment of J. F. Birch, Georgetown, District of Columbia, "and thereby hangs a tale." Somewhere about the year 1800, according to the *Cleveland Herald*, a young man named Webster left Washington for Spain to superintend a mint. After having lived in Spain for some years, he started home with his savings, which amounted to about 1,600 Spanish doubloons (a doubloon being equal to about \$7.20 in gold). On his way to his native land the vessel on which he came was overhauled by a British man-of-war. He was claimed as an Englishman, his money taken, and he pressed into service. After a few months he succeeded in making his escape, and returned home and joined the American army, being determined, if possible, to be revenged for his loss. The war of 1812 was now in progress. It so happened that he was under Perry's command, and participated in the famous victory of Lake Erie. In this engagement he used a cutlass with which he severed the head of a British soldier entirely from his body, so that it fell between the two conflicting vessels. With the same instrument he also killed two other Britishers, beside doing other good service with it. The war being ended, he returned home and presented his cutlass to his younger brother William Webster, as a memento of the victory. His brother, who was an upholsterer by trade, after having kept it for many years, finally had it made into a handsome upholsterer's hammer, and at his death bequeathed it to Mr. George Birch, who has sacredly kept it, valuing it very highly on account of its historic connections.

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## Iron.

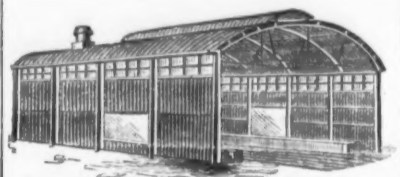
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**AUSABLE FORKS,**

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**FINE CHARCOAL**  
**Blooms & Bars**

For Conversion into Cast Steel.

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rugated Iron Roofing, Shutters, Doors, Flooring, &c.  
Corrugated Sheets of all sizes manufactured by Moseley  
Iron Bridge and Roof Co., No. 5 Dey St., N. Y.**Bonnell, Botsford & Co.,****Iron, Nails & Spikes.**

YOUNGSTOWN, OHIO.

**OLD DOMINION**  
**Iron and Nail Works Co.,**  
**RICHMOND, VA.****R. E. BLANKENSHIP, Commercial Agent,**

Manufacture

**NAILS AND BAR IRON.**Bands, Scrolls, Horse Shoe Bars, Nut and  
Rivet Iron, Spike Rods, Shunting Bridge  
Bolts, Ovals, Half Ovals, Half Rounds, &c.**Notice to Manufacturers of**  
**Fruit Can Trimmings.**The superior quality and cheapness of the produc-  
tion of my **PATENT FRUIT CAN TRIM-**  
**MINGS** (Patented April 6, 1875), having induced  
certain parties to infringe my patent, I have com-  
pelled them to cease manufacturing, and I will pro-  
ceed against any one who may infringe in the future.**The Very Best**  
**FRUIT CAN TRIMMINGS,**  
(3 1-2 Inch Opening.)Are manufactured under process patented April 6,  
1875, at the**WOODBURY STAMPING WORKS,****WOODBURY, N. J.**I am making arrangements to the end that at least  
one prominent house in all the principal cities of the  
United States will keep a supply of my trimmings,  
for the trade.**J. M. PATTERSON,**

Sole Manufacturer,

**WOODBURY, N. J.**Samples furnished free upon application ac-  
companied by business card.**JOHN CARVER,**

Manufacturer of

**Caulking Irons,**  
**COTTON, FREIGHT & Hay Hooks, &c**  
288 Monroe Street, NEW YORK.

With Diaston's Saws.

Sold by Hardware Trade.  
**LANGDON MITCHELL CO.,**  
Send for Circular. Millers Falls, Mass.**Boiler Makers' Machinery at the Cen-**  
**tennial.**Among the many different classes of machin-  
ery which have claimed the attention of manu-  
facturers in this country, there is none which  
has been so completely neglected as that used  
by boiler makers. Considering the large inter-  
est involved in this branch of industry, and the  
great saving in cost of construction possible  
through the use of improved machinery, it  
seems strange that until recently the subject  
should have been so completely ignored.If we go into the average boiler shop we find  
tools of the crudest description, in many cases  
mere makeshifts, constructed without regard  
to any of the rules of design which are con-  
sidered essential in other classes of machinery.  
It may be said that boiler makers, as a class,  
are not progressive, and that an attempt to in-  
troduce improvements among them would meet  
with no encouragement. Such, however, is not  
the case, although it is true that while their  
tools will do the work—no matter how imper-  
fectly, nor at what loss of time—they continue  
to use them in preference to replacing them  
with others. The reason of this is not a lack  
of enterprise, but that the only gain would be  
the difference between old and new tools, and  
not that between improved and unimproved.  
Offer them really improved machines; demon-  
strate positively that they will effect a saving  
in time and labor, and there are but few boiler  
makers who would be so "old foggy" as not to  
desire to have them.Recognizing the importance of this fact,  
some of our most prominent manufacturers  
have recently turned their attention to the sub-  
ject, and as the result we find, among the dif-  
ferent exhibits of this class in Machinery Hall,  
some very creditable improvements over the  
old styles, which, beside showing the progress  
already made, promise well for the attainment  
of a still greater degree of perfection in the  
near future. Owing to the similarity of many  
of the punching machines employed in the  
manufacture of nuts and washers to those used  
by boiler makers, the former may be included  
among this class, although not properly belong-  
ing to it.

WILLIAM SELLERS &amp; CO.

This firm is well known as among the largest  
manufacturers of machinery in America. Their  
display is undoubtedly the most extensive of  
any in the building. Although the exhibit in-  
cludes machinists' tools, steam hammers, shaft-  
ing, &c., beside the class under consideration,  
it will be necessary, for the purpose of systemat-  
izing, to notice at present the latter only, and  
defer consideration of the former classes until  
in due course of progress they may be men-  
tioned respectively in proper order. The dis-  
play of boiler makers' machinery (which is also  
adapted to the use of iron ship and bridge  
builders) is very large, including one punching  
and three shearing machines, one combined  
punching and shearing machine and a hydraulic  
riveter of the portable pattern. Undoubtedly  
the most noticeable of these is a ponderous  
plate shearing machine for cutting 1 inch plate,  
any length, 60 inches wide, and also for trim-  
ming the edges of long plates. The sliding  
head, carrying the working shear blade, is of  
immense size and strength, as is also the hous-  
ing which supports it. Back of the head, to the  
full width of the latter, is an unobstructed  
space, which allows of the unimpeded manipu-  
lation of plates not exceeding that width, with-  
out regard to length. The motion is derived  
from a system of mechanism which is a decided  
novelty in its application to machines of this  
class, and is capable of supplying without  
difficulty the enormous power required in per-  
forming the work for which it is designed.The toggle joint, one of the most powerful of  
all mechanical contrivances, is used in combi-  
nation with a worm segment of 72 inches ra-  
dius and 2½ inches pitch, placed at the inside  
of the right-hand upright of the housing.  
Upon a heavy wrought iron shaft, supported  
by the necessary bearings on top of the housing  
and traversing the whole width of the upper  
link or joint of the toggle, is supported the  
hub of the segment, which by its vibration im-  
parts to the toggle, the upper link of which is  
a continuation of the former, the required mo-  
tion. As the latter is connected with the top  
of the head, a perfectly parallel motion is in-  
sured, while from its being of the full width of  
the head the tremendous crushing strain to  
which it is subjected is distributed over so  
large a surface as to prevent any danger of  
breakage. The machine is driven by open and  
crossed belts 3 inches wide, running upon tight  
and loose pulleys of 36 inches diameter, upon  
the shaft of which is a pinion having 12 teeth,  
which drives a large gear having 96 teeth, keyed  
to the worm shaft. A reverse motion, similar  
to that used by the firm on their planing ma-  
chines, shifts the belts at the proper point.  
The return stroke is about double the speed of  
the cut, the difference being made by means of  
a larger driving pulley on the counter. By  
means of an automatic stop motion the head is  
always stopped at the end of the return stroke,  
to allow of accurate adjustment of the plate.  
When desired, however, the head may be run  
continuously. The stroke is variable up to  
12 inches. The weight of the machine, com-  
plete, is 38,550 lbs. (over 19 tons.) The  
combined punching and shearing machine is  
of good design, and possesses the very  
desirable quality of simplicity of construction.  
The throats are 17½ inches deep from center of  
punch, and 20½ inches from edge of shear.  
The motion of the heads is derived from ec-  
centric pins on main shaft. Each head has an  
independent stop motion. The machine will  
punch 1 inch hole in three-quarter inch iron  
and shear three-quarter inch plate. The single  
punching machine (lever) is of the "horse-  
shoe" pattern of housing, and is designed for  
heavy work, the capacity being 2 inch hole in  
11-10 inch iron. The head is of wrought iron,having a ball and socket bearing for the end of  
the lever. The latter, which is of hammered  
iron, receives motion from a sliding cam ro-  
tated by a large gear driven by a pinion on the  
shaft carrying tight and loose pulley, the former  
having a heavy rim to act as a fly-wheel. The  
stop motion is effected by means of a hand  
lever, which slides the cam upon the shaft  
from under the end of the punch lever. The  
throat is 26 inches deep from center of punch,  
and the die seat is made small for the purpose  
of punching flanges, channels, &c. The plate  
26 inch shearing machine is similar (with the  
exception of having a cast iron head) to the  
machine above mentioned. A shearing machine  
for angle iron (capacity 6x6 in.) has the head  
set parallel with the lever, and inclined forward  
at an angle of 45°. The corresponding edges  
of the stationary and moving blades are parallel,  
for the purpose of preventing the buckling or  
bending of the edges of the piece cut off, as is  
the case where the shears have a gradual cut.  
In all the lever machines mentioned a quick re-  
turn motion is effected by the shape of the  
cam, which allows the lever to drop. The hy-  
draulic riveting machine (Tweddell's patent)  
appears to be a very efficient contrivance for  
any work which it can be made to reach, as it  
is suspended by chains and moved in any direc-  
tion necessary with the utmost ease. The pres-  
sure (water) is maintained by means of a power  
pump, and is stored in a stationary chamber or  
reservoir, called an accumulator, which con-  
nects—by means of hydraulic tubing having  
numerous universal joints which allow of unimped-  
ed motion—with the cylinder containing the  
plunger, to which is attached the working rivet  
die. In this method of riveting the principle  
is entirely different from hand or steam rivet-  
ing, as in the two latter the work is accom-  
plished by impact, while in the former it is by  
pressure. As the best authorities differ as to  
the relative merits of the two methods, it would  
seem for the present to remain an open ques-  
tion, each side having its advocates.

FERRIS &amp; MILES,

of Philadelphia, exhibit but one machine which  
can be classed under this head, the principal  
part of their business being the manufacture of  
machinists' tools and steam hammers. The  
machine referred to is a lever punch, which,  
although entirely different in the design of the  
housing, bears a resemblance in the method of  
obtaining the motion to the machines before  
described. It carries the punch and die at the  
extreme front of the machine, which is very  
narrow, thus enabling the punch to work in  
narrow flanges, ends of flues, and other  
parts which cannot ordinarily be reached by  
punching machines, and consequently have  
to be drilled, which is a rather expensive opera-  
tion on boiler work. The machine is rated  
for ¾ in. hole in ¾ in. iron, 24 inches from  
edge of sheet.

C. A. &amp; W. L. TEAL,

Philadelphia. This firm make a specialty of all  
machinery used in the equipment of boiler  
shops, and by iron ship and bridge builders.  
They have for some time past been engaged in  
making radical changes and improvements over  
the old styles of machinery, and, judging by  
their exhibit, it would appear that the effort has  
met with marked success. Embodying in the ma-  
chines the requisites of good workmanship,  
strength and durability, power, facility of adjust-  
ment, &c., another noticeable feature of the ut-  
most importance, which has heretofore been par-  
tially overlooked, and which attracts a consid-  
erable attention from visitors, is the simple and ef-  
ficient means for taking up the unavoidable lost  
motion caused by wear of the moving parts,  
wherever it can possibly impair the working of  
the machine. Symmetry of design (a point not  
to be despised) has not been neglected, al-  
though excessive finish is avoided as inappro-  
priate in tools of this class. The exhibit con-  
sists of one combined punching and shearing  
machine, one lever punching machine, one set of  
bolter plate bending rolls for hand or power,  
and one for power only. The combined punch-  
ing and shearing machine (eccentric) presents a  
novelty in the design of the housing—it hav-  
ing an undivided section between the throats  
as high as the center of the main shaft, thereby  
doubling the strength of the casting. This of  
course necessitates the use of a smaller gear  
on the main or eccentric shaft, and in order to  
compensate for the consequent loss of power at  
this point the gearing is compounded by the  
interposition of an additional shaft carrying a  
gear and pinion. The sliding heads, carrying  
the punch and shear, have beveled or dove-  
tail side bearings, which render but one ad-  
justment necessary. Lost motion in the ec-  
centric pin and top and bottom bearings of the vi-  
brators, is taken up by a single screw, and can  
be done in a few seconds. The die seat is cap-  
able of very accurate adjustment, and may be  
removed entirely by the withdrawal of a single  
bolt. The shear runs when the bolt is on the  
tight pulley, but the punch can be worked at  
will by the clutch lever or treadle, and is al-  
ways up when the shear is cutting. This an-  
swers every purpose of independent stop motion  
on each head, and prevents all interference  
when both are in use. The machine will punch  
1 inch hole in ¾ inch plate 21 inches  
from the edge, and will shear ¾ inch plate  
same width and 1½ inch bar. The single ma-  
chine (lever) is of the same capacity, and has  
attachments for both punching and shearing  
which can be changed in a few  
minutes. The housing, like that of the  
combined machine is very strong and of  
good design. The lever, which is of solid cast  
steel, is forked at the end of the long arm, and  
carries between the jaws a "cam gear," having  
teeth at each end of the teeth. This cam is  
revolved by a circular pinion having correspond-  
ing teeth and driven by the requisite gearing.  
The construction of the face of the cam is such  
that four-fifths of the revolution are required for  
the downward stroke of the punch, and the re-  
maining one-fifth for the up stroke, thus devel-  
oping immense power, beside securing a quick  
return motion. The great gain in power by the  
revolving over the ordinary sliding cam used in  
lever machines is obvious, as it is simply a com-  
parison between rolling and sliding friction.  
The head and die seat of this machine have ad-  
justments similar to the combined machine.  
The two sets of bending rolls are modifications  
of the same pattern in regard to the points pa-  
tented by the firm. Both are arranged for re-  
moving work from the end of the top roll by  
throwing down the housing, the roll being sup-  
ported and perfectly free from bearing to bear-  
ing. By means of a very simple device this canbe accomplished very quickly, and effects a  
great saving in time. As the bearings of the  
top roll will adjust themselves at any desired  
angle, the machines may be used for bending  
taper.

FUSEY, JONES &amp; CO.,

of Wilmington, Del., exhibit a steam riveting  
machine, an illustrated description of which  
was given in a recent number of *The Iron Age*.

STILES &amp; PARKER,

of Middletown, Ct., exhibit a combined punch-  
ing and shearing machine (eccentric) having  
capacity for punching ¾ inch holes in ¾  
inch plate 18½ inches from edge, and shearing  
¾ inch plate 30 inches from edge. The ma-  
chine contains some novel improvements, the  
most important of which are the vertical ad-  
justment of the heads and the patent punch  
stripper. The former is effected by turning an  
eccentric sleeve or bushing in the vibrator  
which forms the bearing for the eccentric pin.  
A flange on the outer end of the bushing con-  
tains gear teeth of fine pitch which extend to  
one-half of the circumference, thereby enabling  
it to make one-half revolution. A pinion upon  
the end of a T wrench serves to turn the bush-  
ing until the punch or shear are at the proper  
height, when, by tightening a nut at the top of  
the vibrator, the latter clamps upon the bush-  
ing, holding it firmly in position. The punch  
stripper is made by means of a universal lateral  
motion, to adjust itself to inequalities of the  
iron, thus preventing twist or side strain which  
so often causes the breaking of punches while  
stripping. Another important feature of this  
machine is the adjustable automatic stop mo-  
tion of the head, which allows the punch to  
stop on the return stroke at just sufficient height  
above the iron to enable the latter to be moved  
freely.

THE DOTY MFG. CO.,

of Janesville, Wis., make a display of several  
sizes of combined punching and shearing  
machines for hand and power. The mo-  
tion is derived from a powerfully geared  
lever, and is utilized at every available point.  
Beside the punch, which occupies the ordinary  
position, there are three shears, each of which  
is independent of the others, and which are lo-  
cated as follows: Back of the fulcrum pin of  
the lever a hole in the latter and a correspond-  
ing one in the housing forms a bar shear. At  
top of the punch head is a shear for plate iron  
of moderate width, while on top of the hous-  
ing is another, the movable blade of which is  
carried by the lever for shearing double the  
width and one-half the thickness. These ma-  
chines appear to be a very convenient arrange-  
ment for jobbing shops, or where miscellaneous  
work is required.

R. S. NEWBOLD &amp; SON,

Eagle Iron Works, Norristown, Pa., exhibit a  
rotary shearing machine for tube plate and  
boiler plate of the lighter gauges. This ma-  
chine is very valuable where a continuous  
straight cut is required, as is the case in roll-  
ing mills engaged in the manufacture of sheet  
or thin plate iron. By clamping the iron upon  
the carriage of the machine, it may be edged or  
cut into widths very quickly, and with a smooth,  
clean cut. There is also exhibited another ro-  
tary shear of smaller size, which, by means of  
a revolving carriage for holding the work, may  
be used for cutting circles, the position of the  
carriage in relation to the shears regulating the  
diameter.

W. H. STEVENS TOOL CO.,

East Brookfield, Mass., show a powerful shear  
for cutting T rails, and another of smaller size  
for round or square bar.

AMERICAN SAW CO.,

Trenton, N. J. This company, in addition to  
their display of toothing presses, have on the  
opposite side of the aisle to the main exhibit a  
horizontal nut punching machine which, by  
means of two independent motions, is capable  
of making washers and nut blanks complete at  
one operation. As the working parts are prin-  
cipally inside of the housing, the details of the  
construction of the machine cannot be seen,  
but judging from samples of the work it ap-  
pears to be very efficient.

OLD COLONY RIVET WORKS,

New York, exhibit among other articles, a  
number of hand-power punching and shearing  
machines, which, by the use of Broadbent's  
patented mechanical movements, have an as-  
tonishing capacity. The latter is gained by the  
use of a combination of the rolling wedge and  
compound lever, which, it is claimed, render  
these machines the most powerful of their  
class. On the large size machine, with a lever  
3 feet 8 inches long, one man can cut 1 inch  
thick by 5 inches wide.

D. L. KENNEDY,

of New York, also displays a number of hand-  
power machines, having a compound lever mo-  
tion, which appears to be capable of devel-  
oping great power. By a differential toggle on  
the shear lever, the latter will cut as easily at  
the end of the blades as close to the fulcrum.  
Mr. Kennedy exhibits, in addition to the above,  
a number of different sizes of his patent spiral  
pointed punch.

WESTRAY, COPELAND &amp; CO.,

of Barrow-in-Furness, England, exhibit a com-  
bined punching and shearing machine (Beeley's  
patent), designed expressly for the use of boiler  
makers. The peculiar feature of this machine  
is that by the use of a T lever receiving motion  
at the end of the vertical arm an alternate ac-  
tion of the two heads, containing respectively  
punch and shear, is obtained, while the strain  
occasioned by the pressure is transferred from  
the housing to the lever, which, being of  
wrought iron, the manufacturers claim to be  
less liable to injury than the cast iron housing.  
The machine is very simple in construction,  
about one-half of the housing and the driving  
shaft gearing, &c., being below the floor in a  
pit, walled, and floored with cement. By means  
of using a die considerably longer than the  
punch, the machine punches a hole of sufficient  
taper to answer as a countersink for flush  
rivets. The shear head carries at its top an at-  
tachment for cutting angle iron 4x4 in.; while,  
from being set at an angle with the housing,  
it allows of shearing plate and bar of a length  
greater than the depth of the throat. The  
capacity of the machine is 1 inch hole, 1 inch  
plate, 24 inches from edge; shear 1 inch plate,  
23 inches wide.

I. J. FISHER &amp; CO.,

Kincardine, Ontario, Canada, display a machine  
for bevelling the edges of boiler sheets, which  
prepares them for caulking without the neces-  
sity for the slow process of hand chipping.  
The machine is very simple, having a sliding  
head carrying a shear blade whose cutting edge  
forms a much smaller angle than is usually  
employed. The head receives motion from an  
ordinary sliding cam operating a lever, and  
having convenient stop motion. The angle of  
the cut is acquired by inclining the whole ma-  
chine, the bearing plate, which takes the place  
of the lower shear blade, being horizontal. By  
the use of this machine the sheets are cut to  
the required shape, and beveled for caulking  
in the one operation, thereby affecting con-  
siderable saving in time and labor, beside doing  
the work better than can be done by hand.In the Belgian department is a machine for  
punching hot pressed nuts, exhibited by N. H.  
Nigasse & Co. and Aug. Gobert Fils, La Lou-  
verie, Belgium. By means of two sliding cams,  
acting alternately upon the two punches, a com-  
plete blank is punched at each stroke of the  
machine.

## Iron.

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## Cleveland, Brown &amp; Co.

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J. BLODGET BRITTON.This Laboratory was established in 1866, at the instance  
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and refining purposes. The object being to make it at  
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For those of unusual occurrence or difficult to de-  
termine, the charge must necessarily depend  
upon circumstances.  
For determining the per cent. of Sulphur and Phos-  
phorus in Iron or Steel..... 14 00  
For each additional constituent of usual occur-  
rence..... 6 00  
For the per cent. of Carbonate of Lime, and in-  
soluble Silicious Matter in a Limestone..... 10 00  
For each additional constituent..... 2 00  
For the per cent. of Water, Volatile Combust-  
ible Matter, fixed Carbon, and Ash in Coal..... 12 50  
or determining the constituents of a Clay, Slag,  
Coke, or of an Ash of Coal the charges will correspond  
with those for the constituents of an ore.  
For a written opinion or letter of instruction the charge  
must necessarily depend upon circumstances.  
Printed instructions for obtaining proper average sam-  
ples for analysis furnished upon application.

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Superior No. 1 Foundry Iron constantly on hand. Bessemer Iron and  
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All patterns kept in store or made to order. Link and Pin Iron in stock.

## CAPACITY OF WORKS FOR 1876.

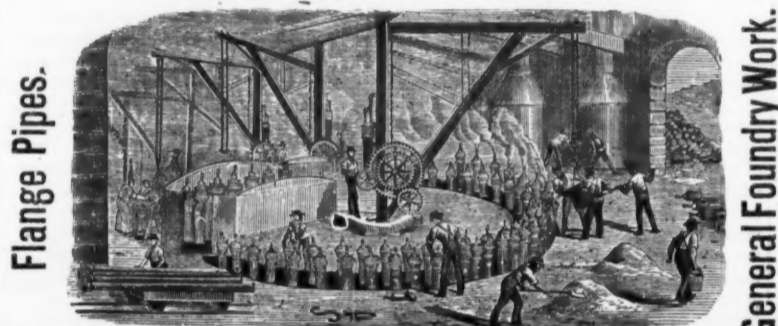
Merchant Bar Iron	20,000 tons.
Pig Iron	35,000 "
Railroad Iron	40,000 "
Railroad Splices and Couplings	5,000 "

Address all correspondence to

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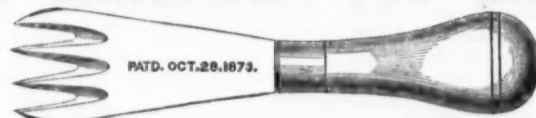
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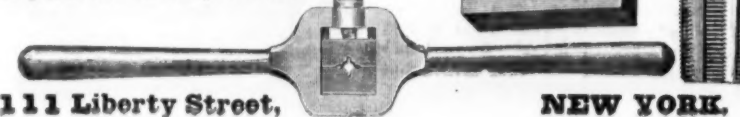
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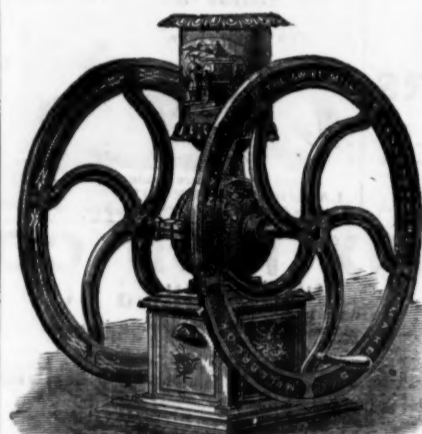
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ment will, in all cases, be warranted perfect and satisfactory.CAUTION.—The public are notified that in my suit against Imhäuser & Co., of New York, a decree  
was made in my favor, June 10, 1874.  
Proceedings have been commenced against said Imhäuser & Co., for selling clocks contrary to the  
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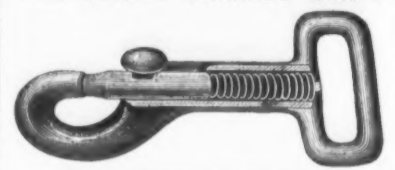
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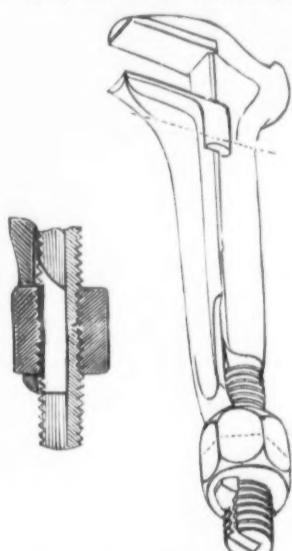
New Patents.

We take the following abstract of new patents, recently issued, from the official record:

WRENCH—REISSUED.

To Robert H. McCormick and William R. Baker, Chicago, Ill.—Said Baker assignor to said McCormick. Patent No. 166,020, dated July 27, 1875.—June 13.

1. The combination of the main portion of the wrench provided with a jaw, guideways, and a screw, with a movable portion provided



with corresponding interlocking guides, and a nut inclosing the two.

2. The improved wrench, hereinbefore set forth, consisting of the combination of the main portion provided with a jaw, guide flanges, a longitudinal guide groove, and a screw, a movable portion provided with a jaw, guide flanges interlocking with the main portion, and a tongue working in the guide groove, and a screw nut working on the main portion and over the sliding portion.

FIRE-PROOF CONSTRUCTION.

To L. Hornblower, Liverpool, England.—June 20.—Iron girders and plates, earthenware hollow cores, concrete filling, and woven wire are combined in an improved manner, to form the walls, floors and ceilings of fire-proof buildings.

1. A composite girder, made up of iron or steel joists and fire-clay or earthenware cores, rigidly connected together.



2. In combination with the rigidly connected joists a and cores c, the interposed tubes d and concrete filling.

3. The combination of girder h, earthenware tubes i, concrete j, and carriers k.

4. The combination of column l, surrounding earthenware tubes m and concrete n.

5. The U-shaped pieces a, connected back to back by bolts b, in combination with wire work c, secured to the flanges of the pieces a.

6. The U-shaped pieces a, connected back to back by bolts b, in combination with hollow tubes c, interposed between the pieces a and concrete filling.

PIPE WRENCH.

To Thomas Booth, Toronto, Canada.—June 20.

1. The pivot pin B, provided with the flattened



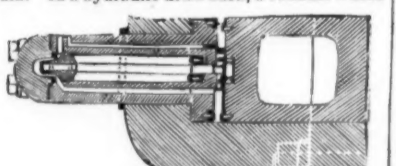
faces B', in combination with the lever A', provided with the slot C and notches c.

2. The jaw A', provided with the face a, between the forked ends a', finished parallel with the faces B' of the pin B.

HYDRAULIC DRAWBACK.

To Coleman Sellers, Philadelphia, Pa.—June 20.

Arrangement of conduits by which equal pressure on both sides of the drawback piston is exerted during the forward movement of the ram. In a hydraulic drawback, a conduit which



connects the inner end of the main cylinder with the outer end of the drawback cylinder, in combination with a conduit which connects the inner end of the drawback cylinder with the accumulator or pump.

178,250.—Lock for Safes, &c.—William L. Potter, Mechanicsville, N. Y.—June 6.

A rubber pad or cushion is so arranged as to receive any inward thrust of the knob spindle of a lock, whereby the force of blows applied to the latter is nearly or quite absorbed by the cushion.

178,251.—Sectional Steam Generator.—David Renshaw, Cohasset, Mass.—June 6.

178,252.—Apparatus for Melting Metals and Ores.—George W. Stafford, Postville, Iowa.—June 6.

178,253.—Dust Trap for Smelting Furnaces.—Thomas J. Taylor, Eureka, Nev.—June 6.

178,270.—Screw Cutting Die Plate.—J. M. Carpenter, Pawtucket, R. I.—June 6.

178,279.—Hammer.—Charles W. Dunlop, Brooklyn, N. Y.—June 6.

178,280.—Metallic Screen.—S. W. Flint, Boston, Mass.—June 6.

178,288.—Auger Handle.—G. L. Gibson, Reno, Nev.—June 6.

178,350.—Machine for Boring Metallic Cylinders.—Franklin B. Traherne, Rockford, Ill.—June 6.

Centering chucks with V shaped prominences (one of which can be swung back on hinges when a new cylinder is to be inserted) for holding the article to be bored; automatic (and also hand) devices for feeding the chuck-holding carriage and cylinder slowly along the boring bar; a weight for counterbalancing that of the carriage, and an automatically operating belt shifter, for transferring the belt from the fixed to the loose pulley when the work has been completed.

178,356.—Self-Closing Hatchway.—S. W. Bell, Burgettstown, Pa.—June 6.

The hatch is of the kind that is opened laterally by the passage of the car, and closed by weights or springs, and is made to fold up in sections to economize space where the hatchway is inconveniently near to a wall.

178,358.—Weigh Scale.—Alanson Carpenter, Angola, Ind.—June 6.

178,406.—Seal Lock.—Walter P. Burrow, Norfolk, Va.—June 6.

178,407.—Claw Bar.—Meshach Butts, Shawnee, Ohio.—June 6.

The handle of the claw bar is bent.

178,408.—Wrench.—Joseph N. Byington, Winona, Minn.—June 6.

178,409.—Screw Cutting Die.—John S. Campbell, Astoria, and Thomas T. Eyre, Salem, Oregon.—June 6.

178,450.—Insertible Saw Teeth.—E. T. Lippert, Millvale, Pa.—June 6.

The tooth is held in position by a wedge, which forces it outwardly into the curved jaws of the recess in the saw plate.

178,311.—Combined Stop Cock and T Joint.—Edward A. Leland, New York.—June 6.

The herein described new article of manufacture—the combined stop cock and T joint—comprising the T joint, the stop cock and the extended ends tapered and splattered and made tapering.

178,824.—Pump.—Isaac H. Palmer, Lodi, Wis.—June 6.

The pump handle is so connected to the pump shaft that when the handle is applied to said shafting the shaft is detached from the pitman of the windmill, and the connection with the windmill restored upon the withdrawal of the handle, the object being to operate the pump either by one or the other, as the occasion may require.

178,401.—Saw Iron Holder.—Ole Borreson, La Crosse, Wis.—June 6.

Strips of wood attached to a sheet of leather or canvas, with a metallic shield for the hand, to intercept the radiated heat.

178,412.—Saw Iron Heater.—John B. Christian, Hamburg, Iowa.—June 6.

The insertion of the iron closes the lids and its withdrawal opens them.

178,483.—Fire Pot for Stoves.—David L. Stiles, Rochester, N. Y.—June 6.

188,519.—Stone Pipe Lining Machine.—Henry Fisher, Cincinnati, Ohio.—June 13.

A pipe is passed over the head of, and on to a cylinder, and is clamped to a sliding frame by a cam lever. An inward tuck is formed on the pipe, at that portion of it covering the a semi-circumferentially grooved ring, by means of a beaded clamp.

The sides of the pipe being open, it may be loosened and fed forward by the sliding clamp operated by a ratchet and pawl. The tuck is then crimped and folded over by an expansible and partly oscillating head, operated by a lever, eccentric and rod, pressing it backward and over on to a former on the grooved ring. A second adjustable clamp relieves the expansible head from strain.

178,547.—Water Heater for Stoves and Ranges.—Jas. E. Montell, Baltimore, Md.—June 13.

178,549.—Method of Tubing Wells.—D. L. Newcomb, Kenton, Ohio.—June 13.

The method or process of tubing or lining wells, consisting, first, in temporarily suspending in the bore or shaft of a well previously excavated the sections of tile, sewer pipe, or other lining between two strips of metal, wood or their equivalent, or a series of such during the process of tubing, and then permanently suspending the column of tubing or other lining in the bore or shaft between said supporting devices, or a series of such.

178,561.—Saw Iron Heater.—Robt. Reed, Philadelphia, Pa.—June 13.

178,617.—Pipe Cutter.—James M. Everts, New Haven, Conn.—June 13.

178,708.—Fire Shovel.—Alfred Bardell, Brooklyn, E. D., N. Y.—June 13.

The handle has a depression, which affords a hold for the thumb, and also serves to strengthen the handle.

178,735.—Chain Pump Bucket.—John A. Churchill, Council Bluffs, Iowa.—June 13.

178,738.—Rain Water Cut Off.—Lodwick U. Crary and Archibald Crary, Middleport, Ohio.—June 13.

178,759.—Gas Cock and Valve.—Charles A. Gerdenier, Bridgport, Conn.—June 13.

178,764.—Heater.—James E. Gridley, St. Paul, Minn.—June 13.

The air is heated in the flues, and, passing to the reservoir, is deflected around the sides of the drum, and makes its exit through the cap.

The following designs were recently patented in the U. S. Patent Office:

9331.—Stoves.—Appollos Richmond, Brooklyn, Conn.—June 6.—Term of patent 14 years.

9343.—Cooking Range.—George A. Wells and John P. Hogan, Troy, N. Y., assignors to Fuller, Warren & Co., same place.—June 14

Term of patent 7 years.

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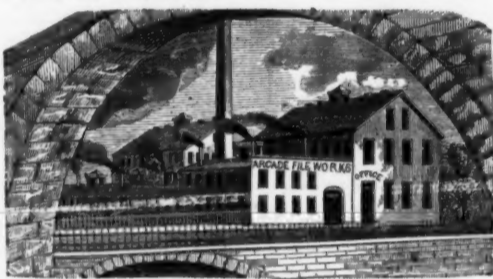
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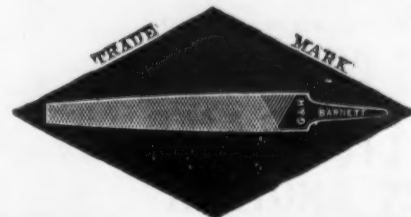
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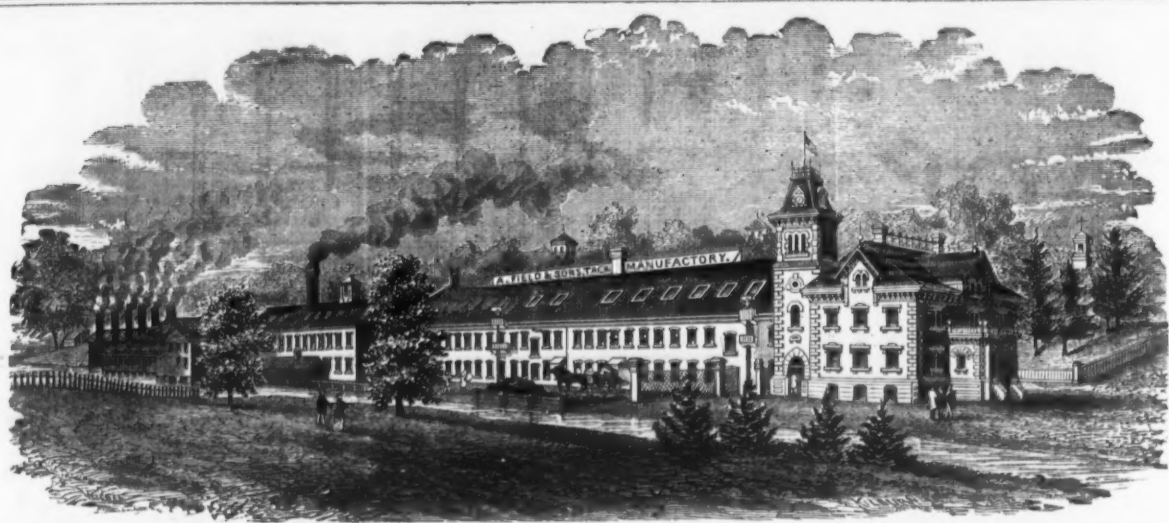
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**CORN HUSKER**  
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Ringer and Rings.  
Only Single Ring  
that closes on the  
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Any variations from the regular size or shape of the above named goods made from samples, to order.

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PATENT  
Self-Coiling, Revolving  
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FIRE AND BURGLAR PROOF.  
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**The Best & Cheapest Shut-**  
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Exposing one match at a time.  
Patent, \$30 per gross.  
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Agents wanted in every  
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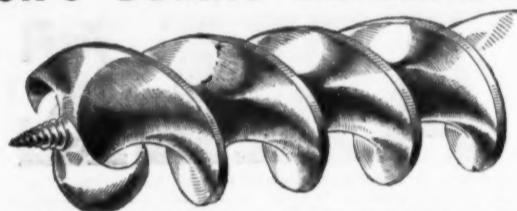
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FACTORIES, Seymour, Conn.

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These goods have been in use over twenty years. We have reduced our List Price of Cook's Augers and Bits. Discounts remain unchanged.

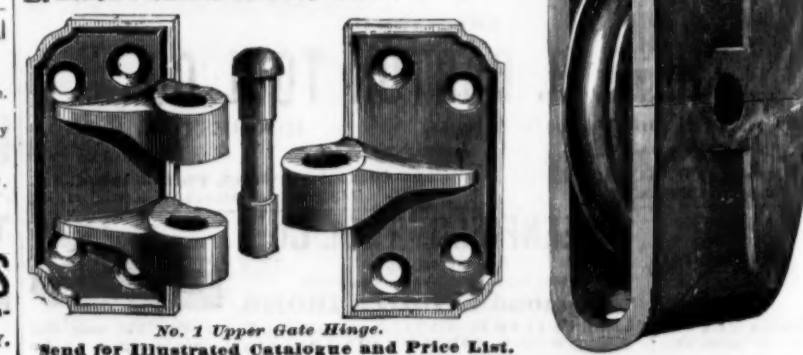
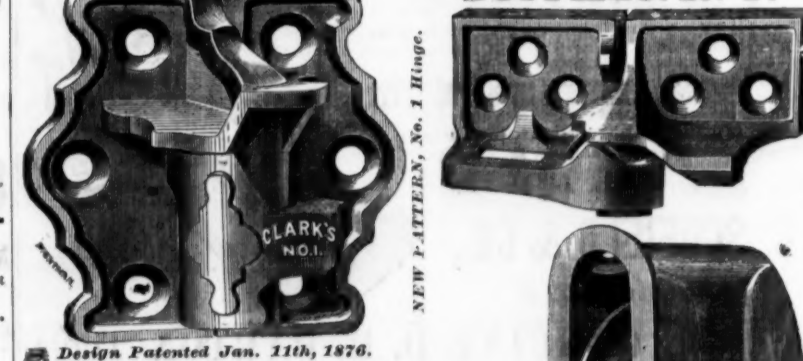
Chisels, Gouges and Drawing Knives of all kinds, Screw Drivers,  
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Bits, Wood and Metal Head Gimlets, Improved Hollow  
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Large Size, superior to stone or brick. Can be used with bel-  
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No. 1 Upper Gate Hinge.  
Send for Illustrated Catalogue and Price List.

### BUSINESS ITEMS.

#### MASSACHUSETTS.

The Globe Horse Nail Company, of Boston, have issued on a large scale a handsomely printed and illustrated circular; it is one of the outgrowths of this Centennial year, and shows at the head a good picture of their immense establishment, with a vignette on each side representing the difference in manufacturing these goods in 1776 and 1876, one showing a blacksmith working at his anvil in 1776, making 6 pounds of finished nails per day, the other showing a nail machine in 1876 with a capacity for 500 pounds of finished nails daily. The circular also presents interior views of three departments of their works, showing a large number of nail machines with their female attendants, the packing room also under the charge of female labor and the heavier preparatory branches operated by masculine help. The greater portion of this circular, which is printed on a sheet 24x42 inches, is devoted to flattering testimonials from United States cavalry shops, and extracts from private letters testifying in handsome terms to the superior quality of the Globe horseshoe nails. It also contains the following testimonial, which is signed by about 1300 practical horseshoers in different sections of the country: "These nails, pointed, polished and finished, ready for driving, are used in our shops, and give entire satisfaction. The peculiar process of manufacture, being cold rolled, gives them a stiffness and a uniformity in thickness, length, width and points. They are thinner and lighter, can be more surely driven without bending and clinched without breaking, than those made by any other process. Such is their uniformity and perfection of finish, that no loss is suffered by hammering, pointing or imperfection. The process of manufacture hardens the points so as to prevent danger of turning or 'pricking,' thus giving such confidence to the shoer as to enable him to work much more rapidly than with other nails. Their stiffness is such as to prevent 'upsetting,' doubling or bending—faults so common with other nails. The points being made perfectly even and uniform, and thinned on both sides alike, gives them a smoothness, brightness and cleanness which insure that the shell of the hoof shall not be broken when they are driven, nor the hoof rusted or 'burned' while they are in use. By this means are avoided many difficulties caused by other nails when driven too close to the sensitive part of the foot. If 'pricking' occurs by carelessness, they will not cause inflammation and pain as would an uneven, rough or scaly nail. With these nails a set of shoes can be driven on as soon as a person can hammer and point a set of other nails, and we can put one-fifth more nails to the pound in the hoof than of such as we are obliged to hammer and point. We find them the thinnest, most convenient and safest nails, both for the shoer and for the animal. In short, we are of opinion that they are the best and most economical nails now in use, and have all the merits the manufacturers claim for them."

The Washburn & Moen Manufacturing Company, Worcester, have abandoned the Eames process of puddling and scrapping by the use of petroleum, the results not being satisfactory.

The Bridgewater Iron Company are running with a much reduced force, and the cotton gin shops are doing but little. The foundry of Henry Perkins is largely engaged in the manufacture of piano plates, and has been doing a fair business during the season.

The Mount Washington Glass Company was organized at New Bedford on the 28th ult., at a meeting of the stockholders. The new stock is all subscribed, and the new company will buy and continue the business of the Mount Washington Glass Works.

The Wire Works of Washburn & Moen, Worcester, are running quite full. Special orders are not as plenty as they have been, but on telegraph, fence and stove wire they have been running double.

The new oil stoves made by the Florence Sewing Machine Company are doing well, over 1500 having been shipped the past month. The foundries are running 14 hours daily, and as soon as new patterns can be completed the Sheffield foundries, which have been closed for some time, will be rented by the company, and worked to their full capacity. Several thousands of the spring skates made by the company are in hand, and a lively fall trade is anticipated.

The Yale Lock Company, of Stamford, have lately completed an extension of their works for the purpose of giving increased capacity for the manufacture of the Yale cabinet locks for drawers, desks, chests, &c. Until lately they have been employing 175 men, and report larger sales this year than for the same period of any previous year. As the officers of the company desire to give their employees a chance to visit the Centennial, it is proposed to close the works during the third week in August. As before mentioned in these columns, the Yale Lock Company have acquired control of the Weston and other patents relating to differential pulley blocks. The only parties who have ventured to infringe were restrained by a recent decision of the United States Circuit Court for Connecticut, and they have since gone out of business. The decision in question, affirming the validity of the Yale Lock Company's patents, will probably protect them in future against further infringements. It is a matter of interest, not generally understood, that purchasers, as well as manufacturers of goods which are made in infringement of a valid patent, are liable in damages.

The E. D. Clapp Manufacturing Co., of Auburn, N. Y. (formerly E. D. Clapp & Co.), has been organized as a stock company with a paid up capital of \$150,000. E. D. Clapp is president; L. E. Carpenter, vice-president; D. E. Clapp, secretary; F. Van Patten, superintendent. The company manufacture over 40 lines of goods, including every piece of hardware used in ironing a carriage except springs and axles. In the future as in the past Messrs. Hayden & Smith will have the exclusive sale of goods made by the company. From 80 to 130 men are employed in the works.

Thompson's Steel Works, at Jersey City, reduced wages 10 per cent., last week, and the workmen acquiesced.

An exchange says: The Harrisburg Mills are all on, and seem to have plenty to do. Bailey's Mill is paying the hot dollar. Paxton's gives a

draw every week to the married men, which they claim is an equivalent for the hot dollar. The pay clerks think that since the draw system was introduced everybody in the mill is married.

The Stewart Iron Company is shipping about 50 tons of pig iron per day.

At Keel Ridge Furnace the workmen are engaged in tearing down and putting up things. The furnace has been cleaned out, all but the back wall, and a new lining, hearth, &c., will be put in as soon as possible. It is intended to raise the bustle pipe (a much needed improvement), and otherwise renovate her. Two new hot blast ovens are to be built at right angles with the stack. The rolling mill is working along smoothly. The heavy machinery is all in place at the new hoop mill, which will be ready to start in a few weeks. At Westerman's the "puddle mill" was off for three days taking stock; all other branches were working. Blast Furnace No. 1 is still undergoing repairs, and No. 2 is working up to 24 tons a day. M. C. Herron did not assume the management of these furnaces as was reported. Mr. E. T. Reed gave up the management Aug. 1st, and goes to Middlesex to take charge of the Shenango furnaces, one of which is to blow in on Monday.—Sharon Herald.

The furnace at Wampum, Lawrence county, "blew out" for repairs last Friday.

A company is about to prospect for oil in the vicinity of West Middlesex. It is the intention to lease 5000 acres of land.

The Hamburg Iron Works, Hamburg, are using the Henderson process entirely. The iron made at this mill is taking the place of English irons for drop forgings and stampings, especially for pistol work and cotton machinery.

Furnace No. 1, of the Cambria Iron Works, at Johnstown, was blown in on Bessemer pig on the 2d inst. This is the third furnace of this corporation run exclusively on this grade of pig.

#### PITTSBURGH AND VICINITY.

The Sable Iron Works (rolling mill and nail factory), of Zug & Co., were sold at auction recently, and was knocked down to Mr. A. E. Keating, for the sum of \$170,000 cash. Mr. Keating has been the book-keeper of the establishment, and it is understood that the property was purchased for Messrs. McIntosh, Hemphill & Co., and others, including Mr. Keating, Mr. Samuel Jack, business manager, and Mr. Charles Zug. The price paid, although only about one-third the original cost of the mill, is satisfactory to the creditors, and considered good by those engaged in the iron business, in view of the general depression, and the fact that the sale was for cash. There was great rejoicing among the mill hands and others residing in the vicinity of the mill, as it was given out that the new proprietors would have the mill in operation inside of thirty days. The mill is one of the largest and most complete in the country, and the resumption of operations cannot fail to prove highly beneficial to a large number of persons.

The old mill of Lindsay & McCutcheon was totally destroyed by fire on Friday last. The fire originated from a furnace stack, the sparks therefrom lodging in the roof of the building beneath the iron sheeting. There were three engines in the old mill. The stock on hand embraced thirty tons of crucible clay, which, together with fixtures, amounted to \$1500. The damage to the building is about \$5000. The mill property, aside from that already mentioned, covered a space of about 150 by 600 feet, including a hoop iron works and rolling mill. The value of the property destroyed is about \$70,000, on which the insurance was \$52,500. The new mill was uninjured.

The Keystone Bridge Company is busy.

The Sharpsburg Sheet Mill is busy day and night.

The puddlers at Hussey, Wells & Co.'s have gone to work.

Jones & Laughlins' Mill has shut down for repairs.

Snoenberger's Mill has shut down for three weeks for repairs.

Chess, Smythe & Co., Southside, have shut down their mill for repairs. They are about to build additional boiling furnaces, which work will be pushed forward rapidly.

The sheet mill of the Sligo Iron Works started up Monday. The entire works will resume operations in two weeks.

#### VIRGINIA.

We learn from the Philadelphia North American that the Atlantic Iron Works, near Norfolk, have been leased by a New York manufacturer, who has purchased the machinery, and is backed by a Northern company of capitalists interested in shipbuilding. The enterprise promises some increase in iron activity and a very useful increase in the construction of iron ships. A marine railway will be constructed at once. The building and repairing of ships will be the principal industry, which cannot fail to increase hereafter in harmony with the general welfare.

The Longdale Furnace is blown by an engine operated by water pressure instead of steam. The head is 78 feet.

The Wytheville Enterprise of July 26th says: "The new furnace of Crockett, Sanders & Co., at their Raven Cliff Furnace, was completed a short time since, and on the 1st inst. the fires were lighted."

#### WEST VIRGINIA.

The Wheeling Intelligencer says: "It is said that more nails were manufactured in this city during the last six months than ever before during the same length of time. We have the figures of three of the principal factories, as follows: Riverside, 136,500 kegs; Belmont, 130,000 kegs; Top, 125,000 kegs. The product of the other mills was in proportion to the above, according to the number of machines in operation. Wheeling has justly earned the name of 'Nail City.'"

The Belwood Company have rented the Ohio City mill for another month from August 5th.

#### OHIO.

The Jefferson Nail Works, Steubenville, shut down on the 1st instant for repairs.

Olive Furnace has been blast for about four weeks, and is doing splendidly.

The work of shoveling out the Iron and Steel Furnace has been completed, and the furnace will blow in the first part of next week.—Iron-ton Register.

Iron ore is being shipped from the Marfield Place, at Vinton Station, to Wellston Furnace. This ore is said to be superior to any found in the vicinity of Wellston. Mr. J. A. Higgins is the superintendent of the mines.—Vinton Record.

Stockwell, Bragg & Co., Ravenna, are steadily enlarging their business, in order to supply the demand for their various screw cutting machinery. Orders for their "Magic Screw Plates" and "Eureka (brace) Threaders" are rapidly increasing. On the 14th instant they shipped a case of these tools, to fill an order, to M. Selig, Jr., & Co., London, England, and they anticipate a large trade across the water.

Emma Furnace, of the Union Iron Company's Works still remains banked up and in excellent condition. She will outdo her former exploit, as she has already exceeded the time (seven months), during which she was banked a year ago.

The prospects for some of the iron works at Niles, Ohio, resuming operations, are said by the Independent to be promising.

(Continued on page 11.)

**TACKS**

FACTORY, Fairhaven, Mass. **AMERICAN TACK CO.,** SALESROOM, 117 Chambers St., N. Y.

Upholstery, Gimp, Brush, Card, Nail and Cheese Box Tacks; Leathered, Tinned and Iron Carpet Tacks; Bright and Blued Finishing Nails; Cigar Box and Chair Nails; Trunk and Clout Nails; Brads, Patent Brads, Copper Tacks and Nails; Iron, Zinc, Steel and Copper Shoe Nails; Polished 2d and 3d Fine Nails; Roofing and Slatting Nails; Roofing Tacks, Tinned Tacks and Nails of every variety. Also, Bright and Japanned Lining and Saddle Nails, Tufting Buttons and Nails of any color. Any size or style of Tack or Nail made to sample. Orders sent to either Factory or Salesroom will receive prompt attention.

**LEIGHTON BRIDGE AND IRON WORKS,**  
Rochester, N. Y.

Wrought Iron Riveted  
Lattice Railroad  
AND  
HIGHWAY BRIDGES.  
Wrought Iron  
WATER PIPE.  
General Riveted Work

The most economical and durable Pipe manufactured for Water Works, Oil Lines or Gas Mains.

Orders Solicited from Civil Engineers and Contractors.  
[Accompanying engraving represents the Springfield Bridge, built by the Leighton Bridge and Iron Works.]

**SPRING PERCH CO., Bridgeport, Conn.**  
Established 1843. Manufacturers of FIRST QUALITY

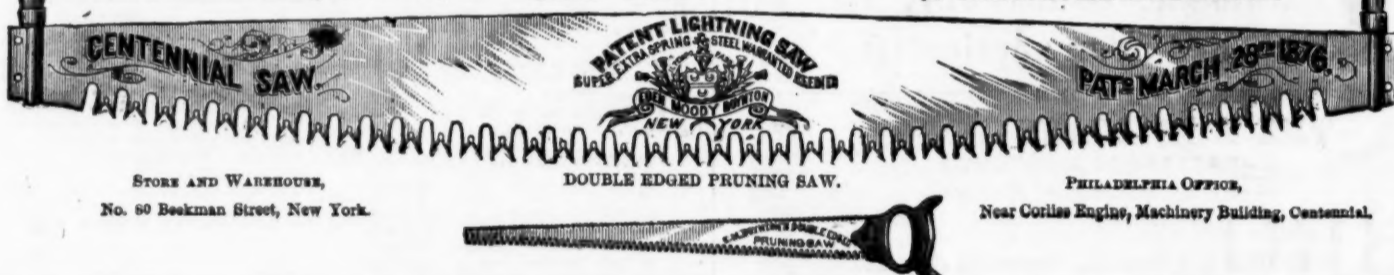
**SPRINGS & AXLES**

And Beer's Patent Curtain Rollers, Concealed Hinges, Etc., Springs of any pattern made to order. Send for Circular and Price List.

Any Dealer is aware that in an ordinary Hand Saw, the front cut is the effective cut, and drawing back the saw has little effect by reason of the slant edges riding over the fibre, as the Saw is drawn back. The difference between the front cut of a Hand Saw, and the back cut, is the difference between the Lightning Saw teeth and all others; for all other saws are set one point and ride on slant edges. By setting two points of my M the same side and the next two the other, I conceal the slant between them, and operate wholly by the outside of a nearly vertical M tooth. Standing nearly vertical the two points of the M occupy the same space as the old V tooth. One point only is cutting and the other follows in the slit behind it to cut in the same manner, in the return motion, thus doubling the cut upon the same base and space of tooth. This construction also gives the breadth and durability of nearly an inch of steel instead of a single slender scraping point, and presents the upright instead of the slant edges to the timber. Any one can in a moment test the principle by comparing the front and back cut of any V tooth Hand Saw. My new patent of March 28th, 1876, allows the saw-dust perfect clearance; the arch slightly widening to the points of teeth renders it impossible for green or resinous saw-dust to be retained, while the slightly increased breadth at base of tooth gives the durability so much advocated by parties who have round-edged files for sale. Slightly pyramidal, the outer edges are as upright as the front cut of a Hand Saw, and the back slant cut is concealed in no other Saw than mine, by setting the two points of M to cut in line instead of alternately. Thus by this new Patent I avoid all "overhang or under-cut," avoid all tearing, and to the matchless speed of the Lightning dress and set, add the durability, simplicity of sharpening, and sweet cutting so much admired. I thus adapt the Lightning tooth to universal use, in all Hand, Pruning, Buck, and Cross-Cut Saws. The concave in the centre of the M saves files, and renders it impossible to file the tooth out of shape. A 10-inch Cant File and Set fitting the M is furnished for forty cents, that will file ten saws easily.

A 16-inch log was sawed off in 17 seconds by hand with a Lightning Cross-Cut Saw, at Pennsylvania State Fair, on September 30th, 1874, before President Eby; W. B. Lawson, S. S. Hoagland, and other officers of the State Board, timing.

\$1000 challenge to any responsible saw manufacturer, to match the Lightning saws in speed of cutting and ease of sharpening. This patent saw tooth has recently been vindicated by U. S. Court decreeing costs and damages for infringements. Beware!



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No. 60 Beekman Street, New York.

DOUBLE EDGED PRUNING SAW.

PHILADELPHIA OFFICE,  
Near Corlies Engine, Machinery Building, Centennial.

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HARDWARE CO.,  
New Haven, Conn.  
ESTABLISHED 1830.  
Manufacturers of  
BUILDERS' HARDWARE, BUTTS, HOUSE  
TRIMMINGS, CARRIAGE,  
And GENERAL HARDWARE

The attention of our old Customers and the Trade generally is invited to our new Illustrated Catalogue just issued, comprising a full assortment of our well known staple goods: Butts (Drilled and Wire Jointed), Thumb Latches, Sash, Upright Screw and Side Pulleys, Wardrobe and Harness Hooks, Draw Pulls, Nut Crackers, Cork Screws, &c., &c. Also several new and attractive styles of Fancy Hardware, at prices to suit the times.

Our new Patent Fancy Open Work Cap Butt, with Ornamented Knuckle, in Real and Imitation Bronze, and our Nickel Plated Cap Butts, with concealed Screws, are the handsomest in the market, and are attracting much attention. While making plain and japanned goods a specialty, we are prepared to meet the increasing demand for ornamented bronze and nickel plated House Trimmings. Goods packed in boxes or bundles, as may be preferred. For catalogue and price list address

**BLAKE BROTHERS HARDWARE CO.,**  
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**C. SCOFIELD'S STRAIGHTENER OR BENDER,**  
For Shafting, Axles, Tubes, Rails, &c.

There has long been a want of some device by which the straightening of shafting could be done without removing the work from the centers, and at the same time do it quickly and accurately. The

**SCOFIELD PATENT SHAFT STRAIGHTENER** meets just such a want; the apparatus is light and can be easily handled, yet it is of sufficient strength for the purpose required. It can be placed upon the shears of the lathe, and moved along the entire length of the work. It is especially

Adapted to Removing Short Bends, which frequently occur in long lengths of shafting. The lightness of the Straightener renders it eminently

Adapted for Line and Counter-Shafting, without necessitating the time and trouble of removing hangers and detaching couplings, but can be

Easily applied to the Shaft while in Position. It can also be used on the bench for short lengths.

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The only GENUINE D. R. BARTON Tools,

ARE MADE BY  
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**GREENFIELD TOOL CO.,**  
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"Diamond" PLANE IRONS,  
EXTRA PLATED TABLE CUTLERY, PATENT FORGED OX SHOES. The only Shoe made with concavity to fit hoof. BENCH AND MOULDING PLANES of every description, &c., &c.  
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Also OSBORN & DRAYTON improvements under twelve different patents. We are continually bringing out new and beautiful designs to meet the demands of refinement and taste.  
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The only Knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the **Best American Knife**. We also make

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which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory, and in New York by Messrs. J. Clark Wilson & Co., No. 81 Beekman Street (who have a full stock of all patterns always on hand), and also by Messrs. G. B. Walbridge & Co., No. 99 Chambers Street.

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Aaron Burkinshaw. My Blades are forged from the best Cast Steel, and warranted. To me was awarded the GOLD MEDAL of the Connecticut State Agricultural Society; also a 1st and 2nd Diplomas from the Mass. Mechanics' Ass'n Sept. 1870.

## Young's Patent Folding Scissors.



These Scissors are made of the very best steel, nickel plated, and so constructed that they can be readily folded and carried in the pocket without injury to the garments. A sample pair will be sent by mail, to the trade only, upon receipt of the retail price, namely: For small size, either blunt or pointed, \$1.00 Large size, pointed or half pointed, \$1.50 New York, Feb. 1st, 1876.

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Fine English and German Pocket Knives, Extra Shears and Scissors, Champion Fluting Machine. **CHEAP.** CHARLES FELDER, 89 Thomas Street, N. Y.

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## BUSINESS ITEMS.

(Continued from page 9.)

## OHIO.

The forge department of the Lake Erie Iron Works is virtually idle; the mill is running along about as it has been for the past six months, on small orders for merchant iron.—Trade Review.

John Russell, a nailer in Brown, Bonnell & Co.'s Nail Factory, Youngstown, has just cut 251 kegs of 20d. nails in 60 hours. This is said to be a remarkably big run.

All the Jackson furnaces being idle that village is now very quiet.

The Lawrence Rolling Mills, of Ironton, last week made a shipment of small T rail to the Warland, Ky., coal mines. Warland still continues to go ahead with their mining operations, in spite of adverse hard times and combinations.

## WISCONSIN.

A fire at Beloit, on Friday, destroyed John Thompson & Co.'s plow and wagon works. Loss, \$80,000; insurance, \$3000.

## MICHIGAN.

The following mining items are from the Mining Journal: "The Erie Mining Company have about 1500 tons of ore on the Klonan docks, which they will begin shipping next week. The ore was hauled from the Erie mine to the Klonan last winter on sleighs. It is to go to Cleveland via Marquette. The Pittsburgh and Lake Angeline mine employ a force of about 75 men, and is making shipments from a stock pile of about 15,000 tons. The product will show an increase over last year. The Appleton Iron Company has gone into bankruptcy. Liabilities, \$300,000. The Republican Iron Company are now employing about 350 men, exclusive of those engaged at "the canal" on the water-power. They are shipping from 800 to 1000 tons daily, and are mining a little more than 500 tons per day, the balance being loaded from stock piles. The average daily produce for the month will be about 500 tons."

The same paper gives the shipment of ore from the Lake Superior district for the season up to and including Wednesday, July 26, as follows:

Place.	1875.	1876.
From Marquette.....	317,147	218,411
From Escanaba.....	166,747	138,548
From L'Anse.....	27,781	32,324
Total.....	511,675	409,283

Showing an increase of 68,058 gross tons.

The Marquette Mining Journal says No. 1 stack of the Pioneer Furnace produced 10,530 tons in a run of 14 months, and the hearth is still good for several months' longer run.

Mining Furnace, Schoolcraft county, resumed blast on the 14th ult., and will continue blowing till the supply of wood and coal on the bank and at the kilns is exhausted.

## KENTUCKY.

Messrs. Means, Culbertson & Means are building a new furnace to be called the "Princess," near William's Creek, about ten miles from Ashland. The site of the new furnace is about three-fourths of a mile from the L. & B. S. R. R. E. D., and a mile and a half this side of the old "Buena Vista" site, the latter having been dismantled and the stack torn down.

The location is a beautiful one, in close proximity to plenty of water, easily accessible to a fine vein of smelting coal and other minerals, and the Ashland Journal expresses the hope that it will, in course of time, make a reputation equal, if not superior to the mother—Buena Vista—furnace.

Belleville blew in last week.

During the first six months of this year Hunnewell has made 3300 tons of No. 1 charcoal iron.

President Murdoch, of the Ironton Steel Works, is about to give a thorough trial to the Louisa blackband ore. Articles have been entered into, according to which 2800 tons will undergo a test by October 1st.

The Louisville Rolling Mill Company's "Big Mill" is closed, locked up and a watchman put in charge, and while he watches the property the proprietors watch for better times. The probabilities now are that the mill will not turn a wheel until the fall of 1877.

A portion of the works of the new Jos. H. Brown Iron and Steel Company have started up.

The furnaces of the North Chicago Rolling Mill were blown in the last of July.

## TENNESSEE.

The Chattanooga Iron Company's furnace is now turning out 28 tons No. 1 foundry iron per day, showing a gradual increase in capacity for the last few weeks. It is an excellent quality of foundry iron, and finds a ready market through the West and South.

## MISSOURI.

St. Louis File Works, Louis Hoek proprietor, are running with a large force of hands. The files and rasps made at this establishment are finding a market in the West, South and Southwest, where they have a good reputation.

## INDIANA.

The Indianapolis Rolling Mill Company have decided not to make any more merchant iron. They have been running the Capitol City Mill.

The blast furnace at Brazil is ready to blow in.

The Terre Haute Iron and Nail Company have been having trouble with their boilers.

The following, which we take from the London Trade Journal, is quite characteristic: Paper duties are not dead yet. Though they have long ceased to exist in England, they are cultivated and maintained in their worst form by some of our foreign competitors. Formerly paper making was a peculiar glory of English enterprise. The raw material was collected from all parts of Europe, worked up in England, and distributed again to all parts of the world. Some of the rag and esparto grass countries have lately become jealous of us. They wish to work up their own raw material, not because they can do it cheaper than British manufacturers, but because they hope to enrich themselves by practically robbing each other. In order to insure native paper mills from being undersold by England at their own doors, the rags or other material is subjected to an export duty before it can leave the producing country, and when it returns in the shape of finished paper it has to pay an import duty. This system of taking toll at both ends of the bridge is rather too much for English paper makers, and they lately invoked the assistance of Lord Derby against it. They showed that esparto grass, which enabled them some years ago to counteract the artificial rise in the value of rag, is now being rendered dear by the same means. His lordship could make no definite promise, but he is gathering an enormous mass of evidence that our foreign commercial treaties are capable of great improvement. The more of them that have to be renewed the greater will the gravity of this question become.

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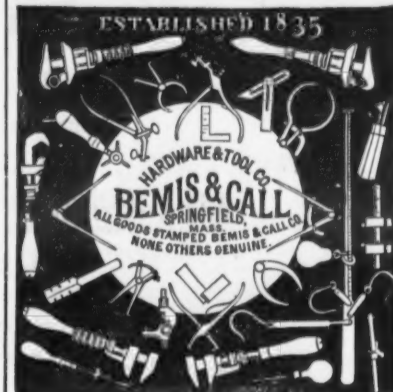
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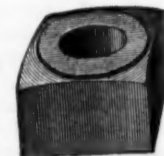
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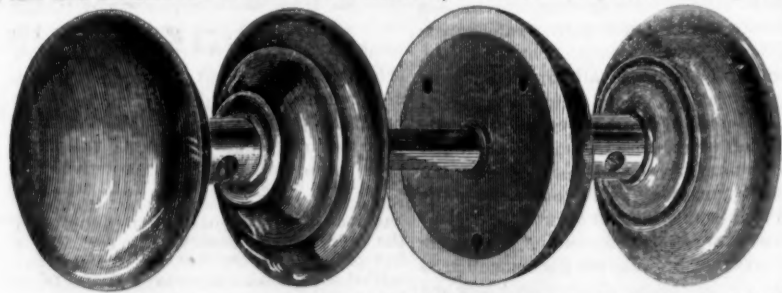
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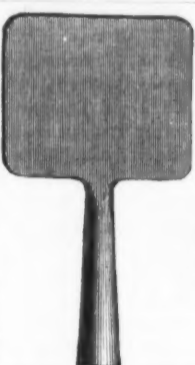
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## The Amalgamation of Iron and Steel Workers.

The proceedings of the convention of iron and steel workers, held last week at Pittsburgh, and which resulted in the formation of the National Amalgamated Association of Iron and Steel Workers, merits the careful attention of every manufacturer of iron and steel in the country. We have no desire to be regarded as alarmists, nor, on the other hand, do we wish to under-rate the strength of the movement. We believe that, from the very constitution of the association, there is an element of weakness that will in the end disintegrate it and break it up into its original elements: but for the present, at least, these disturbing forces will not be manifest, and this new union will have a power to compel obedience to their terms such as no union in the country has ever possessed. This power will be all the more tyrannically and unreasonably exercised if the supineness of our manufacturers, or their failure to comprehend the present strength of the union, and to provide for the protection of themselves against its power, shall make them an easy conquest in the first trial of strength which is bound to come.

The only course of safety is for every iron and steel manufacturer in the country to combine in an association that shall be as powerful as that of the workers. The only way to meet organization is by organization. The strength of the puddlers here-

fore has been that they were organized and were ready to act as a unit when the time came. The weakness of the manufacturers was that they had no organization, and were united only as long as their interests led them to be. It is no secret that if the manufacturers had stood firm and united at Pittsburgh a year ago last winter, they would have won. But the interests of one man led him to break away, and the rest followed. Indeed, the arguments in favor of a united action among the manufacturers all over the country are too obvious to need any repetition. The main ones to be advanced against it are strictly and narrowly selfish.

If this is to be undertaken there is need of action at once. It will require time to perfect such an organization, and to have it in order when the time comes to act. The puddlers have, by their own act, in the West at least, put off the time for a strike until next summer. They need it to perfect the details of their organization and to prepare for the contest, and the manufacturers can be doing the same. We imagine that such an organization will go far toward preventing the necessity of using it. In previous strikes the strikers have presumed on the fact that the manufacturers were not united, and continued them in hope that some weak one would yield and the others follow. They have also drawn from one section of the country support for the strikes of another. If a strike could be made to mean a stoppage of work all along the line, it would have terrors it does not now possess. On the other hand, manufacturers would be more careful and judicious in their acts. Among reasoning men power always makes one conservative, and the knowledge of the results of a lock-out or strike would lead them to exercise the utmost prudence.

## Local Engineering Works.

During the next few years New York and vicinity promise to present many attractions to those interested in great engineering works. Beside the excavations under the Hallet's Point reef, by which the navigation of the East River is to be made safe and easy, we have the great Brooklyn bridge, the tunnel to connect Manhattan Island with the New Jersey shore under the Hudson River, and the bridge to span the Hudson River near Poughkeepsie. The operations at Hell Gate are an old story, and we need give no particulars concerning them. The two bridges and the tunnel are matters of general interest, and a few facts concerning them will, no doubt, be acceptable to many of our readers.

As is generally known, a vigorous effort has lately been made in the interest of the shipowners of this port to obtain a permanent injunction restricting the projects of the East River bridge from stretching the cables—the plea being that it would impose a heavy tax on commerce by compelling ships passing under the bridge to send down their topmasts and royals, and that it would impede the navigation of the river. It must be conceded that there was much foundation for this complaint, but the plea for a permanent injunction has been denied by the courts. In the test case of *Miller vs. The Mayors of the City of New York and Brooklyn, and the Trustees of the East River Bridge Company*, Chief Justice Johnson of the United States Circuit Court, has decided that there are no grounds for an injunction and denied the motion. As there is no likelihood that this decision will be appealed from, it is announced that work upon the bridge will go on immediately. The coils of the preliminary three-quarter inch cables, made by Roebbing's Sons, at Trenton, are now on the ground, and are to be stretched next week. The method to be employed is described as follows:

The first cable will be placed upon large drums on the top of the Brooklyn anchorage, and after the end has been carried over the tower it will be conveyed over the river by a ship or tug, over a large pulley on the New York anchorage, and the end carried back and united with the other, thus forming the first continuous rope, as "traveler" for the conveyance of the larger cables. The clamps for securing the 2½ inch steel cables of the temporary bridge were tested on the New York dock a day or two ago. These clamps are of brass, 5 feet long and proportionately thick, with projections for securing them to the mooring of the anchorage. Their inner surface is, of course, concave, and grooved so as to conform to the twisted surface of the cable; they are firmly bolted together. The clamps were fastened to a piece of the rope and a strain of 175 tons applied by steam, and no indication of weakness was detected. Carpenters have nearly completed the flooring of the foot-bridge. It is made in sections 12 feet long and 4 feet wide, and consists of a heavy oak lattice work firmly clinched. After the two 2½ inch ropes are ready it will be advanced along them from either side, the sections being fastened together on the tops of the towers, and shoved or pulled out. They will finally be secured to the ropes at short intervals with strong cables.

When these preliminaries are completed, the work of stretching the main cables will begin. The manner of their making is thus described by the engineers in charge of the work:

On the top of the Brooklyn anchorage will be placed 40 drums, each holding enough No. 7 galvanized wire to span the river twice. These wires will be stretched by the several "travelers," and tightened until they have the same deflection. After 330 have been stretched they will be bound together by clamps or wire wrapping every 6 inches, thus forming a bundle of parallel wires. Nineteen of these bundles will constitute the cable. After all are in readiness the first clamps will be removed and the entire 6270 wires will be bound together by large clamps and wound for their entire length with wire. It will be seen, therefore, that these cables are not twisted, as is generally supposed. Though simple in appearance, the construction of these cables is a very difficult work, and requires great skill. The wind will prevent the work being carried on for about half the working days in a year, for each wire must have precisely the same deflection as the other in the same strand, else it will be of a different length, and thus worse than useless in the cable. To stretch them properly a perfectly calm day is required. On the top of each tower there are four large iron saddles upon which the cables will rest. There is one at each side of the towers and two in the middle. They weigh 14 tons each, and to allow contraction and expansion of the bridge, will have an opportunity to play upon galvanized steel rollers 4 inches in diameter, the rollers resting in large pan-shaped plates, which are secured to the towers. On the sides of the saddles are small grooves for the temporary cables. While in course of construction the main cables will not rest in the grooves of the saddles, but upon large pulleys arranged over them, and upon completion they will be carefully lowered.

The progress of the work upon the bridge will be watched with great attention by all who are interested in engineering science, and will not be without interest for the general public.

The Poughkeepsie Bridge Company, after many difficulties and discouragements, have at last got their affairs into such shape that they can go ahead with the work this summer. A great deal of the work of preparation has already been done, and there will, we are told, be no delay when the construction has fairly begun. The design of Mr. J. H. Linville, Chief Engineer, provides for five spans of 525 feet each, supported on stone piers. The lower chord will be 130 feet, and the grade 190 feet above high water mark. The eastern approach consists of five spans of 260 feet each, and five of 185 feet each, at varying elevations. As the depth of the river at this point varies from fifty to sixty feet, the stone piers will be from 180 to 190 feet in height, and considering the immense length of the spans, the volume of water crossed and the depth to rock, the building of this bridge will be one of the grandest engineering accomplishments of the century. We shall be able to give much fuller details as the work progresses.

Like the East River Bridge, the Hudson River Tunnel has been the subject of much vexatious and costly litigation. The work was begun early in 1875, by sinking a vertical shaft of brick masonry, 30 feet in diameter and four feet thick, between the depots of the Erie and Delaware, Lackawanna and Western Railways. The exact location is the intersection of Jersey avenue and Fifteenth street, about midway between the suburb of Jersey City known as Pavonia, and the lower end of Hoboken. After the excavation had reached a depth of about 20 feet, the Delaware, Lackawanna and Western Railroad Company obtained an injunction, on the ground that the privileges granted in the Tunnel Company's charter infringed the inalienable riparian rights of the State, and by having recourse to the various expedients not unknown to railway lawyers, managed to prevent the dissolving of the injunction until a few days ago. The case has now been decided in favor of the Tunnel Company, the injunctions are removed, and the work is to be pushed forward vigorously. The tunnel will be 26 feet in diameter, and will probably cost from ten to fifteen millions. These great enterprises, with the less imposing, but equally necessary, undertakings soon to be set on foot in the interest of rapid transit within the city limits, will make New York and its immediate neighborhood a point of especial interest for intelligent travelers from all parts of the world. Nowhere will be seen as many great undertakings in simultaneous progress within so small a radius, while each will be found to possess especial interest on account of its magnitude.

## The Decline in Spelter.

The annual consumption of spelter in the United States in normal times is between 10,000 and 12,000 tons. Our home product averages about this amount, enabling us by degrees to dispense very nearly altogether with the importation of the foreign article. But at times there are periods of prolonged stagnation in the brass industry of this country, and as spelter is chiefly consumed by us in the manufacture of this alloy, it is apt to become so excessively dull while this quiet state of affairs lasts that it becomes very nearly unsalable except at a ruinously low figure, entailing loss to the producer.

In consequence of the mild winter an early spring trade was expected, and with it the usual animation in metals. Early in February the combined spelter producers therefore resolved to raise the price

of domestic spelter from 7½¢. to 7¾¢., currency, in anticipation of the steady demand from brass manufacturers, which they looked forward to with great confidence. Copper at the time also stood 23¢., based on similar hopes. But the expectations entertained at the time have not been fulfilled. The bulk of the spelter produced since has remained in stock at the works and principal centers of distribution, and there is now little or no vent to this gradual accumulation. The metal is pressed on the market by needy outside parties, and the combination has become of no avail. Prices have steadily declined, and domestic spelter does not at present command over 7¢., currency, in the market. The combination proved a decided success as long as a tolerably good demand existed, and accomplished what had been its object. It undersold foreign sufficiently to discourage importation, but left a living profit to the producer, and while doing so it steadied prices, inspiring the consumer with confidence in the stability of prevailing rates, and causing him frequently to anticipate wants. In other words, the good management of these combined producers lent the domestic article moral and material aid, and our spelter soon gained popularity and overcame prejudices in favor of Silesian and other foreign sorts. Eventually, this harmonious condition will be restored to the spelter market. Spelter production is one of the elements of national activity which render us independent of the caprices of European fluctuations, and therefore has our full sympathy, the more so as we feel sure that under a general revival in business the uses of spelter can and will be greatly multiplied.

In Europe spelter has become more popular among metal workers year after year, and the amount produced barely suffices to cover the growing wants. Prices over there would have been even better sustained than they were of late, had we been under the necessity of drawing from there the amount we require, as was the case some five or six years ago. Spelter is one of the metals in which consumption is generally admitted to outrun production. Hence the great efforts which the English are unceasingly making to procure calamine even from remoter sources of supply and under difficulties, as they have all along done from the Spanish mountains. Between our own country and Europe there will consequently be no glut of spelter anywhere, as soon as matters begin to revive in a durable manner in both hemispheres, even supposing that we begin to turn out considerably more than we do at present. A proviso would have to be made, of course, as regards some unexpectedly large discoveries in Australia or elsewhere not now apparent; but as the metal is situated at present, it seems to be safe enough from the moment the usual consumptive demand is permitted to again manifest itself in full force.

For twenty years past there has not been such a total absence of speculation in a branch of trade which, in ordinary times, attracts surplus capital easier than any other from the imperishable nature of the articles constituting it, and the sense of solidity which thus attaches to them. Not only is there no speculation, but even the trade and consumers decline to venture beyond pressing wants, notwithstanding the fact that metals are, taken together, cheaper now than they have been for the past fifteen years, and money almost a drug. But we firmly believe that the present apparently exaggerated depression will work its own cure by curtailing the production of some metals, if but temporarily. Spelter may be one of them.

## How to Prevent Railway Accidents.

An item in a recent issue of one of the dailies contains the following: "A railroad disaster in Spain has resulted in a law providing that, when an accident in any way chargeable to the railroad company occurs, the company shall pay \$15,000 to the family of each person killed, \$7000 to the family of each person incapacitated, and \$5 a day to each injured person until recovery."

We can hardly credit the statement, which, if true, shows that Spain, the last of all nations in the way of improvement, has provided the most effective method of avoiding railway accidents which it is possible to devise. These simple provisions are sufficient to insure perfect safety from accidents resulting from preventable causes, even in the absence of all our absurd railway legislation. Were such a law enacted and enforced in this country, and the railroads left free to work in their own way and run trains as they should deem best, untrammelled by annoying legislation, safety to life and limb would be next to absolute. Our railroads are able to take care of passengers and servants, but they are not compelled to make the provisions which they know are best, while they are forced to do many

things for the sake of safety which they know are utterly useless. Of course they will not do any more than is absolutely necessary to come up to the legal requirements. Could we leave the roads free, as the Spanish law seems to, and make safety the requirement without troubling ourselves about the means, the railroad officials would not be long in finding out what the best thing to do would be. For example, it was not many years ago that a State legislature felt called upon to investigate and legislate upon the subject of trains rolling from high banks and bridges. The legislative committee proposed all sorts of expedients, and called engineers and railway men as witnesses, putting them upon the stand under oath, we believe. The engineers said that the plans of the legislative committee were folly; the railway men stated some facts and then held their tongues, while inventors talked about stone walls, barks of timber, sheet iron fenders and the like to their heart's content. Fortunately for once the legislators realized the fact that the subject was too much for them, and dropped the matter. They had found out simply nothing upon the subject in hand—the means of prevention—yet if it had been necessary to have taken precautionary measures almost any of the experts called could have rendered traffic on any road safer at the bridges and embankments.

Experience has very clearly shown that honorable empirics in legislature assembled are in no respect competent to prescribe the conditions of railway management. So far as the safety of travel is concerned, the laws they have enacted have been worse than useless. Behind these the corporations—who are not without influence in committee rooms and lobbies—shelter themselves when passengers are killed or injured. They comply with the letter of the statutes, and there their responsibility ceases. The victim of their negligence or carelessness has recourse against them in the courts, but not easy recourse. It has been the policy of our railroads to make it "terrible" to sue them, and only those can try the law's delays with a railroad company who have abundant means, and can afford to employ counsel by the year. Knowing this, few venture the experiment, and when a railroad makes an offer of a compromise its terms are very likely to be accepted, however little relation the amount tendered may bear to the compensation justly due. Were the pecuniary liabilities of our railroad companies fixed by law, and all suits against them for damages tried by the public prosecutor on behalf of the public—as in any other case of murder or manslaughter—accidents to passenger trains would become so rare that even the most timid traveler might feel as great a sense of security as though he were in bed at home. But the ways and means of safety must not be prescribed, or we should only make a bad matter worse by depriving the unfortunate victim of a railroad of the dubious recourse he now has in common law. Of course, we do not expect that such laws will ever be passed. Some things are possible in poor, distraught, priest ridden, revolutionary Spain, which are not possible in this great, glorious, free enlightened Republic, and legislation of this kind is one of these things. There the government controls the railroads—here, in the majority of the States, the railroads control the government.

## Natural Gas.

An experiment of considerable interest was lately made at the gas wells supplying the Pittsburgh mills with gas—or, perhaps it would more correctly express it to say with the transportation of the gas through pipes. The Natural Gas Company, owning the wells and pipe line that have been supplying gas to the mills of Messrs. Spang, Chalfant & Co. and Graff, Bennett & Co., have lately drilled a new well some 2½ miles from the old Harvey Well. About the feasibility of conveying the gas from this new well through the same pipe that the gas from the old well was conducted, as well as about the whole subject of the transportation of gas in pipes, there has been a good deal of controversy and many utterances, some wise and some otherwise. It was stoutly claimed that, if one well was weaker than the other, the gas from the stronger would "back up" and prevent any escape from the weaker. It was also asserted with much scientific gravity that the proper way to convey gas was by pipes varying in diameter like a pocket telescope, some asserting that the discharge should be from the small end, and others as earnestly advocating the large end. While the result of the action of the Natural Gas Company has not positively settled this fight between the "big enders" and "little enders," it has given data on the subject, and has settled the question of conveying gas from two wells through one pipe.

The distance between the old and new

well is, as stated, some 2½ miles. In conveying the gas from the new well to the pipe leading to Pittsburgh from the old one, the connection was made with the tubing at the well by a 6 inch pipe. This ran for about 400 yards, and a 4 inch pipe was attached for some 2 miles, from which place a 3 inch pipe was used to the connection with the 6 inch main leading to Pittsburgh. The connection was made from the old well with the main by a 2 inch pipe, and the connections being made the gauge at the old well showed 125 lbs. to the square inch, and at the new well 150.

The effect on the pressure at the mills in Pittsburgh was very marked. With the old well alone the pressure of gas at Spang, Chalfant & Co.'s mill was 2½ lbs. With the new well added the pressure rose to 10 lbs. at the mill, and the waste gas blowing off outside of the mill through a 3 inch pipe opened full. With the new well alone the pressure was 5 lbs., and blowing off through the same pipe about half opened.

#### What Germany Secured with Alsace and Lorraine.

Present appearances indicate that the territory acquired by Germany from France in the late war, consisting of the provinces of Alsace and Lorraine, are likely to prove very troublesome possessions. Previous to the war the production of these provinces found a market chiefly in other parts of France. When they became German States, and were cut off from the French markets by the duties imposed for the protection of French manufacturers, they began to flood Germany with manufactured goods, and the cry now goes up from the German manufacturing districts that Alsace and Lorraine are ruining the whole empire. In ingenuity, economy, dexterity and enterprise, as well as in artistic taste, the French manufacturers and artisans are far ahead of those of Germany. In certain lines of manufacturing Alsace and Lorraine led all Europe, and by incorporating these States Germany has created a home competition which promises to cause an industrial paralysis in many parts of the new Empire. In the present depressed condition of trade the demands of the markets are limited, and the manufacturers of the newly acquired States are pushing vigorously to secure a practical monopoly of what trade there is. As they can manufacture cheaper and better goods than can be made elsewhere in Germany, they have but little trouble in securing orders in competition with the German manufacturers in their own markets. The result is, as we have said, a bitter complaint of overproduction, depreciation in values, loss of interest on capital invested in manufactures and insufficient employment for labor. There is something of retributive justice in this, which should satisfy France for the loss of territory, even though it brings but poor consolation to the people forced by the strong hand of military power to change their nationality as reparation for the sins of a weak and foolish monarch. Germany already has cause to repent the territorial acquisition which gave her so much satisfaction when gained. It is possible to make a German citizen out of a Frenchman, but he does not thereby become a German except in name, and in a competition for a common market he will prove more than a match for the less ingenious and skillful Tueton.

The diamond drill seems to have a mission to convert the bonanza gamblers from the errors of their ways. It is stated that the recent heavy decline in "Consolidated Virginia," a decline of over 50 per cent., was due in part, at least, to the revelations of the drill, which has shown the near exhaustion of the mine. It is stated that Flood & O'Brien have thrown one-third of their stock on the market within the last thirty days, and are rapidly unloading the rest. The employment of the diamond drill will introduce an element of certainty into mine financing, that will most effectually limit stock gambling in the shares of these mines.

#### New Publications.

THE AMERICAN IRON TRADE IN 1876, politically, historically and statistically considered, by James M. Swank, Secretary of the American Iron and Steel Association. Annual report to January 1st, 1876.

Mr. Swank's annual reports have become a feature of standard value in the statistical literature of the American iron trade. So thoroughly is his work done as Secretary of the Iron and Steel Association, that no one else has considered it worth while to traverse the same ground for several years. Consequently, the publications of the Iron and Steel Association are accepted as statistical authority by the press and public at home and abroad. This year Mr. Swank has extended the scope of his labors somewhat, and prints a Centennial report of about 200 pages, which contains a vast amount of carefully collected information, much of which we have been kindly permitted to publish from advanced sheets.

Of the complete volume we can speak but briefly. Like all of Mr. Swank's work, it is done with a care and thoroughness which gives it exceptional value among statistical publications. It has been the labor of many months, and the work of revision has been almost as exacting in its demands as that of compilation. The introductory chapters, on the industrial policies of Great Britain and the United States, show a great deal of research, and constitute together a strong argument in favor of a policy of protection to home industry. The history of the American iron trade was compiled from all available records, and is probably as thorough as it could be made at this time, and the statistics are happily free from any haphazard estimates and elements of uncertainty which

are so often found in table work. Mr. Swank and his accomplished assistant, Mr. Cope, are certainly entitled to the thanks of the iron trade for the manner in which their work has been done. We shall have occasion to speak of the report in subsequent issues.

THE SILK INDUSTRY IN AMERICA. A history prepared for the Centennial Exposition. By L. P. Brockett, M. D.

This attractive and interesting work is published under the auspices of the Silk Association of America, and is a timely contribution to our Centennial literature. It contains many interesting details of the lives and efforts of the pioneers in silk industry, and of the more recent achievements in the manufacture. There are also presented valuable tables of statistics, in great part new and expressly prepared for this work, which show the large mercantile and manufacturing interests involved, and offer many suggestive facts concerning capital and labor. Although no effort has been spared to make this history complete, it is not claimed that the object has been fully attained in this publication. With a view to reach this point hereafter, the Silk Association of America solicits the communication of any relevant data, incidents or biographies, that have been overlooked in the present volume. In furtherance of this object, the Association is also collecting a library of books, pamphlets, newspaper extracts and other publications descriptive of or related to the development of the silk industry from its earliest period in this country; and will be greatly obliged by the donation or loan of such material, addressed to Mr. Franklin Allen, Secretary of the Silk Association, No. 73 Duane street, N. Y.

#### Hardware, Agricultural Implements, &c., at the Centennial.

##### Agricultural Hall.

GRAHAM, EMLEN & PASSMORE, Philadelphia, manufacturers of the Philadelphia lawn mowers, make a very fine display of these machines; they show them in all the sizes in which they are made from a 10 inch cut, requiring but little power to work it, and which is designed for ladies' use, up to and including a 30 inch cut, with seat and shafts, and intended for use with one horse. The 10 inch cut machine weighs about 28 pounds, runs light, and cuts a swath 10 inches wide. It is intended for cutting the grass on narrow beds, and meets the wants of those whose grass plots are too small to warrant the purchase of the larger and more expensive machines. This machine is retailed at \$15, and is not provided with side wheels. The 12, 14, 16, 18 and 20 inch cut, with 6½ inch side wheels, and weighing respectively 34, 37, 41, 46 and 50 pounds, are smooth working, simple and effective machines. The manufacturers, in a circular describing these machines, say: "We ask the special attention of those using the Philadelphia lawn mowers to the printed directions sent with each machine; and to the fact that if kept properly adjusted, they are self-sharpening, and are so simple and compact that it is almost impossible to get them out of order unless unreasonably abused. Recollect that but little over half the strength is required to work one of our side wheel mowers that it takes to operate the old style heavy roller machines, and that, although so light, so few pieces are used in their construction that each piece is much stronger than the similar part of any other kind of lawn mower, so that they will last much longer." Beside the lawn mowers mentioned above, they make without side wheels a 14 and 16 inch cut, a 15 inch cut with 8½ inch wheels, and several styles of horse machines.

##### A. J. OHMER,

Hamilton, Ohio, exhibits the Novelty lawn or grass mower, a light machine, the cutters of which are made on the same principle as is used in mowers and reapers; the power is furnished by the driver, and is derived from a cog wheel arrangement, to which is attached a crank handle, operating a rod which runs along the pushing bar of the machine, and which works the knives backward and forward. The manufacturer of this machine claims for it that it is the only mower that can cut tall grass and cut trimming. These lawn mowers are all provided with rollers, and are made in 4 sizes, 14, 16, 18 and 20 inches wide, and weighing respectively 16, 18, 20 and 25 lbs. There is also on exhibition a No. 5 machine on the same principle, which is not included among lawn mowers, and is intended for mowing clover, grain or grass for feed or hay. This machine has 9 inch iron wheels only, and is side draft. It is claimed that it has an advantage over the scythe of letting the grass fall where it grew, saving trouble to scatter for curing; also of doing more work, and is suited for those who have not enough work for the employment of a field mower. These machines range in price from \$10 to \$30.

##### THE HILLS ARCHIMEDEAN LAWN MOWER COMPANY,

Colt's Armory, Hartford, Conn., make a fine display of their machines. They say of their mowers: "These mowers have become celebrated throughout the world where lawns are cultivated, as being the most durable machine of its kind in use. It contains all the improvements that experience in their manufacture can suggest—are easily operated, have a full roller, noiseless ratchet, and an adjustable iron handle which can be raised or lowered at the convenience of the operator—and will do splendid work on every variety of lawn. They are the lightest roller lawn mower made of their capacity." They are made 10, 12 and 14 inch cut for hand-power, and 28 and 32 inch for horse. The same company also exhibit the new "Charter Oak" lawn mower, which they describe in a circular as follows: "Its peculiar construction combines the good points of both a roller and a wheel machine, making it very durable and light running. It weighs fifteen pounds less than the old style mowers, is very easily operated, and the beauty and evenness of its work can not be surpassed. It carries the regular gearing of a roller machine,

which is beautifully and substantially inclosed within its side frame, a point necessary for durability as well as to prevent clogging of the gears. The machine is mounted on two large driving wheels, or pulleys, and instead of being on the outside of the frames, to run in the uneven grass like all other wheel mowers, they are placed inside the frames back of the cutting blades, running on a shaft, each independent of the other, allowing the machine to be turned either to the right or the left without injury to the sod, and to be turned around in a circle no greater than its own length, and cutting at the same time. It is also provided with a neatly constructed iron handle, which, being adjustable, can be raised or lowered at the convenience of the operator, allowing the machine to adapt itself to the inequalities of the ground without losing power, and at the same time to make an even and level cut. One very important feature is its three-bladed solid revolving cutter, working in patent boxes, so constructed that grass cannot wind around the shaft of the cutter, which overcomes a serious objection in most all other lawn mowers. The revolving cutter is provided with steel cutting edges, which can be replaced when necessary, without the expense of buying a new knife." This machine is made in four sizes for hand-power, viz.: 10, 12, 15 and 18 inch cut, and two sizes for pony and horse, viz.: 28 and 32 inch cut. They are well made and handsomely finished, and the driving wheels being inside the frames enable the operator to cut the grass clean around walks, flower beds, &c., which is an advantage that cannot fail to commend this machine to practical people. They also exhibit sets of floral tools in neat paper boxes containing trowel, hoe, rake and weeding fork. These goods are well finished and are shown in two sizes, retaining at \$1 and \$1.25 per set respectively.

##### CHADBORN & COLDWELL MFG. CO.,

Newburgh, N. Y., exhibit a handsome assortment of their celebrated "Excelsior" lawn mowers. These machines are made in eight sizes—four for hand-power, of 9, 12, 15 and 18 inch cut respectively; and four for horse-power, of 25, 30, 35 and 40 inch cut respectively. They claim for the "Excelsior" over other mowers that "it runs lighter; it cuts the borders; it cuts higher grass; the gears are perfectly covered; it rolls the ground; it needs less repairs; its adjustments are more simple; and the roller does not run in the standing grass." These lawn mowers can be seen in operation in Central Park, New York; Boston Common; Government Grounds, Washington; and in many other prominent parks and public grounds in the United States and Canada. Regarding their new "Excelsior" horse lawn mower they say: "In the construction of our new horse lawn mowers only the very best material is used, and the design is such as to combine the greatest possible strength with lightness of draught and perfect working qualities. The gears are perfectly covered, like those of our hand mowers, and, therefore, becoming clogged with grass or dirt is simply impossible. We manufacture four sizes of this new horse mower, enabling us to supply the wants of those having small lawns, as well as those having more extensive ones. We confidently make the claim of manufacturing the most perfect horse lawn mower in use." This company also manufacture and exhibit Chadborn's automatic smoked beef cutter, which seems to be a very practical and perfect working machine, and one that will fill a want long felt by almost every grocer, butcher and hotel keeper in the land. This machine will cut soft beef as well as dry, and it cuts perfectly uniform in thickness, it takes up but little room, and any one that can turn a crank can use it. It is very simple in construction, and not liable to get out of order, as the edge of the knife only touches the meat. When sharpening is needed, it can be done without removing the knife.

##### THE RHODE ISLAND HORSESHOE CO.,

Providence, R. I., exhibit on a handsome stand, in the form of a mammoth horseshoe, a large assortment of their specialties, among which we notice their new patterns of Perkins' improved horseshoes in nine different sizes, both light, medium and heavy, from No. 9 to No. 8 inclusive; Perkins' pattern mule shoes; Perkins' pattern snow or mud shoes; Rhode Island pattern horseshoes, and Perkins' pattern trotting shoes. In a circular regarding these goods the company say: "We claim that the horse and mule shoes manufactured by us are more durable, easier to adjust and cheaper for the consumer than any other machine-made animal shoe in the market. They have reached their present high state of excellence by having had the closest attention paid to the details of manufacture and by the use of a selected stock, which produces a tough, hard and fibrous iron. By the completeness of our machinery we are enabled during the process of manufacture to improve the quality of the iron by hammering it by a succession of quick, sharp and drawing blows, and to give to the shoes a uniform shape and quality. We are also enabled to create or fuller the shoe in the best proportion for receiving the nail head, to obtain the proper position and angle of the nail holes and to round the outside edge; and, by our process of thickening the heel, the iron at that point is increased in hardness. These are all points necessary to produce a perfect shoe, and are well understood and appreciated by the consumer, and are not reached in such perfect form by any other horseshoe machinery. The Perkins' pattern animal shoe machinery now owned and operated by us, from the simplicity of its construction and ease of management, can be readily adapted to the manufacture of shoes suited to the wants of any part of the world." This exhibit contains the largest assortment of these goods that we have seen, and for variety and completeness it will compare favorably with any similar line of goods on exhibition. It is located at B. 23, Agricultural Hall, and is

in charge of Mr. Frank Durrie, of New York. S. S. PUTNAM & CO., Neponset, Mass., exhibit their Government Standard hammer pointed horse nails in all the sizes required by the trade and consumers. They say of these goods, which will compare favorably in point of finish with any similar line on the market: "The reputation which the 'Putnam Nail' has obtained as the 'Government Standard Horseshoe Nail' of the country places it in the highest rank of machine-made nails. The great difficulty heretofore experienced in obtaining brands of iron combining strength, toughness and freedom from flaws, we have overcome by having our iron manufactured expressly for us in Norway, which enables us to offer a nail unsurpassed in the world. After many years of experience, and with new and improved machinery under our own patents, we now offer to our many patrons and the public a highly finished 'hammer pointed' horseshoe nail ready for use, which we warrant to be of uniform character in all respects, and designed to maintain the reputation we have so long held among the horseshoers of the country. These nails are made separately, the iron when nearly at a welding heat being drawn out under hammers, by which means it is made firmer, tougher and more compact than by any other process. In our process of pointing these nails no superfluous metal is removed by cutting or clipping, thus exposing the fibers or grains of the iron, and rendering them liable to split or shiver when driven into the hoof, but a most perfect weld is maintained at the extreme point when finished, which cannot be excelled by the most expert smith upon the anvil. As we manufacture under our own 'Patents,' all parties selling or using the 'Putnam hammer pointed horseshoe nail' are guaranteed against all patent liabilities."

##### NATIONAL HORSE NAIL CO.,

Vergennes, Vt., show an assortment of polished and pointed horse nails.

##### A. H. CARL & SON,

Forge Village, Mass., exhibit Eureka hammered horse nails, pointed and finished, made from Norway iron; also the same goods not pointed. They further show the "Good-enough" pattern nails, pointed and plain, and countersunk head English pattern horse nails.

##### THE OLIVER CHILLED PLOW.

The exhibit made by the South Bend Iron Works, of Indiana, in Agricultural Hall, is one of the handsomest displays in that building, and must be seen to be properly appreciated. There is an elegant model of the well known Oliver plow in gold bronze, which is said to have cost about \$600, while there are other plows of the ordinary size which cost from \$500 to \$1000 each. These are of rosewood, nickel-plate and bronze, and of great beauty. They are richly carved and ornamented, the device being appropriately emblematic of agriculture, fruits, grains, &c., and are admired by the ordinary visitor for their artistic and graceful appearance, as well as commended for their superior qualities by those whose avocations enable them to express an intelligent opinion. The leading advantages claimed for this plow are briefly: "That it is a general purpose plow, that will do all the plowing on a farm well and easily." By a system of changeable shares, it can be adapted to ordinary spring plowing, heavy clay, stony lands, dry, baked soils, &c.; and with the improved "marsh share," marshes, wet prairies, willow roots, hazel roots, &c., can be plowed with ease. Every piece is supplied in exact duplicates, fitted by machinery, and can be replaced by the man using it. The "General Purpose" and "Junior" (or sod) plows, can be changed from one to the other by changing mold-boards, and every dealer selling the plows is obligated to keep on hand a full supply of shares and other repairs. An important discovery by Mr. Oliver is the material known as Oliver's chilled metal, the hardest substance in use that is adapted to plow making. It is so dense and compact in grain that it will receive and retain almost as high a polish as a mirror. An ordinary drill, file, or cutting instrument make no more impression on it than on glass, and it is impossible to raise a wiry edge on it, nor will rust eat into it. It is of uniform hardness all over. The tempering and forming being done at the same operation, there is no danger of soft spots. Mold boards of this material wear much longer than steel, while its scouring qualities improve with use. In its plan of construction it differs widely from the ordinary plow. The beam is placed in the middle of the work, giving the plow a center draft. By the use of slots at the heel and in the head of the post the beam can be moved its whole length to either side, so as to retain this center draft under all circumstances, balancing the plow so that it will run without being held, and relieving team and plowman from working the plow on a twist. The adjusting is done at the heel of the beam, and is so simple and complete that the plow is always under full control of the plowman. Another advantage of this plan is the non-choking qualities imparted to the plow. The beam and standard being placed inside the line on which the growth raises over the top of the share, allow it to pass by on the land side, and drag off on the edge of the furrow, hence the plow works easily where an ordinary plow could not be used at all. Another important point is the device by which the whole face of the cutter, share and mold are made to present a uniform and continuous surface to the soil, leaving no opening behind the cutter, causing a uniform friction over every inch of the share and mold, leaving no spot or angle on which the soil can lodge and clog the plow or add to its draft; cutting and turning on the same curve, thus relieving the plow quickly from the weight of the soil, adding increased strength to the share by giving it twice the usual length of bearing, and putting more metal into the nose, where it is needed. This

simple device, aided by the hardness of Oliver's chilled metal, imparts to the plow two of its most valuable properties, viz., lightness of draft (which means saving of horse flesh, feed, time and money), and superior scouring qualities.

##### Machinery Hall.

##### H. BURDEN & SONS, THOT, N. Y.

In Machinery Hall, Section B. 3, Column 23, may be seen a beautiful model of Burden's patent for making horseshoes by machinery. Their exhibit of horseshoes, however, is in Agricultural Hall. The machine is not a very complicated one, but, on the contrary, its leading features are easily understood. The two things which first strike the eye in connection with the machine are some wheels, and a long reheating furnace adjoining them. Bars of iron 40 feet in length are brought hot from the rolling mill, and placed in the reheating furnace for the purpose of annealing the iron. As soon as this process is completed, the bar of iron is passed into the machine through two rollers, which act as automatic feeders, the rollers being kept in constant pressure on the bar by an attachment to the cutting lever, which, working on a cam, cuts off the bar just the necessary length of iron to make one horseshoe. At the moment of cutting off, the bending tongue catches the piece cut off and carries it into the first die, which gives the form and shape to the shoe. It then passes on to another roll and shaft, called the creasing shaft, on which is a die to which the creasers are attached, and by means of which the creasing of the shoe is produced, while at the same time the holes for the nails are pierced. The shoe is now complete, and has only to be heated and fitted by the local blacksmith before being used. One great advantage of this machine is, that any shoe of any shape, size or pattern can be made upon it with the utmost ease. A buyer may send a shoe of peculiar pattern, and his order, no matter how large, will be delivered to him exactly in accordance with the pattern sent. It is accomplished in this way: A plaster cast of the pattern shoe is carefully taken, and this plaster cast is used instead of the ordinary wooden pattern, for making the sand mold in which the iron die is to be cast. By this means the cast iron die, when placed in position in the machine, possesses the absolute counterpart of the original pattern. In precisely the same way the creasing can be done in any desired shape or form, and the nail holes as easily made of any desired angle. As soon as the horse shoe comes from the second die (a supply of water is always kept dripping from the machine), it is carried off to the store house on an endless chain, and by the time it arrived there is comparatively cool. The store house is a large circular building, composed of radiating bins, with just open space enough in the center to allow a horse and wagon to turn round. Every bin has its own size and shape of shoe, the bins holding in the aggregate 7000 tons of finished shoes. The plant at present in use turns out about 600 tons of shoes per week, but we are informed that the firm are putting in new plant which will double their capacity of production, and will shortly have another storehouse complete, doubling their storage capacity. The machine ordinarily turns out 60 to 70 shoes per minute, and can turn out as many as 100 per minute. The late Henry Burden was the inventor of this machine, and also, we are informed, of the "Burden squeezer," through which all the iron made into two-thirds of the rails laid down in Great Britain passed for many years. Mr. B. also built the first elgar boat, and in 1850 organized in Glasgow, the famous Atlantic ferry, for building and running a line of steamers to this country, of greater length in proportion to beam, and of greater tonnage than any then in vogue. His designs were, in fact, almost the counterpart of those now used in the construction of such vessels as the White Star Steamship Company run so successfully. As an evidence of the appreciation in which Mr. Burden's inventions are held, we may say that very recently the Royal Historical Society, of Great Britain, applied to Mr. Burden's family for all the information they could furnish with regard to his connection with steamship building, and his many valuable inventions, for the purpose of making due record of them for the benefit of the whole British nation.

##### Main Building.

##### SWEDISH DEPARTMENT.

The exhibits of hardware, cutlery, edge tools and saws in the Swedish department are, with scarcely an exception, examples of what America is concerned, of a bygone age. In locks of all the varieties shown, and we noticed padlocks, cabinet locks, mortise and rim locks, the styles are heavy, and the finish will contrast very unfavorably with the goods required in our markets. In padlocks some of the goods are so common that even their cheapness, which is brought to the notice of the visitor, would not help our imagination to find a place for them. A good assortment of files is shown, but these possess no special feature that we could discern. We also noticed assortments of edge tools, such as chisels, plane irons, and kindred goods which were, with few exceptions, heavier proportioned than those in use in our markets. A few cases of well finished razors are exhibited, and a fair line of plumbers' brass goods, such as faucets, couplings, &c. A good deal of space in this department is devoted to saws, but nothing is shown that will at all compare for style and finish with the American goods of this class on exhibition. Among the saws exhibited are billet webs, mill, cross-cut, pit and circular saws, hand, panel and rip saws, &c.

##### A. G. NEWMAN,

No. 1172 Broadway, New York, exhibits Buckman's patent torsion spring door butts and door springs on two very handsomely mounted doors. These butts are supplied both single and double acting. The manufacturer says of these goods: "The superiority of the Torsion over any form of spiral spring, is universally acknowledged. Our application of the spring is endorsed by the approval of architects and builders. The spring, which is protected by the connecting rods, acts directly upon the butts, producing a prompt and effective action, which is completely under control, and can be increased or diminished at pleasure. It is simple, durable, easily applied, well protected from accidents, and when damaged easily and cheaply repaired." On many of the finest buildings in New York these goods have been applied, and we believe they have in all cases proved entirely satisfactory. Mr. Newman also exhibits an improved electrical elevator annunciator, which only requires one wire for any number of floors. It not only exposes the number on the indicator, but it strikes it also on a bell so as to be of equal service after dark in elevators where a lamp is not used. Beside the foregoing, he also shows a patent French flat indicator, having in combination with bell pull a speaking tube, letter box with lock and key, and a name plate so arranged that the name can be readily changed.





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to be buyers. Very few descriptions of local production are changing hands, there being only a very slight call indeed for certain kinds of bars suitable for steel converting purposes.

In the Leeds district the depression of trade is quite as severely felt as it is in the immediate vicinity. The latest monthly report of the Leeds Chamber of Commerce states that "there does not seem to be any resumption of activity in the heavy branches of the iron trade, and the forces are but poorly employed. Inquiries for locomotives are few, and orders are difficult to obtain. The engineering and machine trade have fallen off, and many works have far less than their full complement of hands. The same may be said of the tool trade, and the cut nail makers have also experienced a falling off in orders." All this and more, probably, might be said of the corresponding industries of the whole of South Yorkshire, Barnsley and North Derbyshire. Many of the leading houses just outside Sheffield ordinarily do a very considerable business in all kinds of castings, and many of them have a reputation for special goods, as well as for builders' requisites, girders, &c., but none of them at the present juncture are even half employed, and most are thinning out the number of their workmen. On all sides the most exact and minute economies are being enforced, and it is hardly too much to assert that if no change takes place within the next six months, by the end of that period half the whole producing power of the district will be laid off. In many branches of industry, the shoe is already pinching most painfully, and there are not wanting rumors as to the stability of more than one iron works and colliery concern within a radius of 20 miles or so.

It is in the coal trade, however, that the most serious state of things is likely to come about, the output being now treble the demand, whilst many of the collieries have been sunk at the most enormous outlay of capital. One or two collieries are already closed, and preparations are being made for closing several other old pits, which cannot be worked at a profit at existing quotations. There is now also an exceedingly keen competition between the local coal owners and those of Northumberland and Durham for the London trade. The northern proprietors have the great advantage of sea freights to the metropolis, by which, although the relative distance is so much greater, they save fully 2 1/2 per cent. as compared with the railway rates from this district. Railway carriage and wagon hire from South Yorkshire to London amount to fully 10 per cent. beside terminal charges for the tax and delivery, so that the hard Barnsley coal put into London at 25 per ton does not leave much profit either for the merchant or producer.

With regard to the proposed return to the 10 hours system of working, there does not appear to be, as yet, complete unanimity among the employers of labor. All are quite convinced that the change is in every sense desirable, but some of them—including two or three concerns of great magnitude—are not in a position to risk a strike. The Iron Trades Employers' Association again met in Leeds last week, and reports were read from all parts of Lancashire and Yorkshire, favoring the proposal to re-establish the 10 hours. Nothing definite was settled, but it was tentatively resolved that the retrogression, if enforced, should be primarily applied to the engineers, iron founders, machine makers and shipbuilders.

In cutlery there is really and truly "nothing doing," and in this branch, too, Madame Rumor is very busily at work, with, perhaps, some little reason.

#### DEATHS OF SHEFFIELD MANUFACTURERS.

On Wednesday last Mr. Charles Wardlaw, senior partner of S. & C. Wardlaw, steel manufacturers, Sheffield, died after a short illness. Mr. Wardlaw was not of strong constitution, but he had great mental vigor and perseverance, which rendered him very successful in business. The firm, as your readers know, have a high reputation in America for really fine steel. Mr. Wardlaw was a member of the Sheffield School Board, and was at all times to the fore in educational matters. His loss in this respect will be very deeply felt. I have also to record the death of Mr. William Taiton Bury, which took place on Saturday, somewhat unexpectedly. Mr. Bury was a good business man. He was only 41 years of age, and had long been the managing director of Bury & Co. (limited), Penstone Road, Sheffield, who had a good reputation for their steel, patent picks, saws, &c.

#### SHEFFIELD TRADE WITH AMERICA.

Under this heading the Sheffield Daily Telegraph of Saturday publishes a somewhat remarkable statement of opinions and facts of a general nature highly flattering to the *amour propre* of your trade. I may tell you that the opinions ascribed to a "high authority" are in reality those of the most eminent and most thoroughly practical steel manufacturer in Sheffield. The *Telegraph* says:

"Having recently had the opportunity of hearing from gentlemen whose judgment can be relied upon, the ideas, gathered from personal observation in the United States, of the present position and prospects of trade, we proceed briefly to place their conclusions before the public. One of our informants, who is an undoubtedly high authority on all matters referring to our staple trades, gives it as his decided opinion that the iron trade, not only of Sheffield, but of the country, with the States is nearly at an end. The export of Bessemer rails and of the majority of the common kinds of steel in existing requirements, is nearly at a season, but permanently. In high-class steel the Americans are endeavoring to supply themselves, but it is not considered likely that they will succeed in this effort. There is not the slightest probability, however, of the trade in Bessemer rails or iron ever returning to the old channel. American manufacturers are at present able to produce all the Bessemer steel they require for their own use; but in the event of a very sudden or great demand—such as another railway mania—they might require to export a quantity, but that requirement would be only of a temporary nature, as they could rapidly increase even existing facilities for production.

"There is keen competition among the American steel and iron manufacturers, who are not only keeping the home trade in their own hands, but are pushing into our Colonial markets, especially into Australia and Canada. The Canadians, it would appear, complain very much of their country being overrun by American merchants. In regard to hardware, a great portion of that trade is hopelessly gone. The secondary descriptions of cutlery are nearly all supplied by American manufacturers; the higher classes, with known names such as Rogers, Wostenholme, Harrison, and a few others, are still in demand. How long this demand may continue will, of course, depend upon the American manufacturers themselves—whether or not they are able to convince their customers that their cutlery is equal to the best Sheffield make. To two leading causes is the present condition of things attributable—the prohibitive tariff rates, and the prejudicial changes commencing with the coal famine of 1870, which reached its climax in 1873. Of late years the Americans, with the aid of high tariff, and aided by the advanced prices which ruled at home, have been enabled to work in their manufactures in iron, steel and hardware for their own consumption; and the conclusion comes to by those best able to judge is that they have done this thoroughly. There is a good deal of "soreness" on this score. Not a few

English manufacturers regard it as most unjustifiable that while America charges a higher duty on a ton of best steel than Russia, Germany and France put together; yet all American goods—reaping machines, sewing machines, forks, shovels, and all the multitudinous array of "Yankee notions," with which the British public is so familiar—come into this country duty free. The American, by imposing duties varying from 35 to 60 per cent., practically excludes English goods from American markets, and yet all the English markets are open to him. This one-sided arrangement operates most injuriously against the manufacturers of this country, who stoutly maintain that there ought to be reciprocity. England takes every year large quantities of American manufactures, and also millions of pounds sterling of the spare produce of the States, and the whole of these manufactured goods, as well as the produce, enter our ports duty free. While the American manufacturer is thus able to close his own markets against English competitors, and at the same time have the run of the English markets, it is any wonder that the English iron, steel and cutlery trade with America should be so seriously affected? The tariff, which is most unjust and practically prohibitive, is believed to be the work of the manufacturers of Pennsylvania, who by keeping out English productions secure an unfair advantage for their own manufactures of iron and steel.

"The adaptation of machinery to almost every purpose is specially noticeable in the States. Economy of labor is everywhere carefully studied. English workmen may depend upon it that the States are no place for them at present. The American workmen work longer hours and labor under greater disadvantages than their brethren on 'this side the ferry.' Their workshops are far inferior to those in England, and in consequence of recent reductions rigidly insisted upon, they are no better paid than English artisans, although the cost of living in the States is so much dearer. At present there is much distress among the working classes, labor being less plentiful than laborers. Many thousands are idle, and all agree in stating that trade was never so bad in the States as it is at this moment."

STAFFORDSHIRE, BIRMINGHAM AND WALES, all remain inactive so far as iron is in question, the monotony being difficult for many firms to bear without stoppage of payments. In the Birmingham hardware trades there is a little more activity, excepting the edge tool, implement and a few other branches. At Willenhall, the strike of 400 workmen for an advance of 10 per cent. has terminated, by the arbitrator to whom the dispute had been referred, giving an increase of 7 1/2 per cent. From the Welsh and Monmouthshire ports last week's shipments of iron, rails and steel were 7332 tons, mostly to Antwerp, Amsterdam, Naples, Drontheim, Montreal, Genoa, Brindisi, Rio de Janeiro, Soderhamn and Huelva.

#### THE METAL MARKETS.

have again ruled very quiet, and prices are lower. At the Cornish ticketing at Truro on Tuesday, the copper standard was reduced 25 per cent; 314 tons of copper ore were offered and realized £13,144.8, an average of 24.3 6 per ton; 216 tons of pure copper sold at £100 per ton.

The Mining Journal remarks: "Copper.—The market has been weak, and prices have again fallen all round in English, Colonial and foreign. The firmness displayed by holders of Chili a short time since has entirely vanished, and they are now ready enough to realize at rates considerably below those formerly ruling, several hundred tons having been disposed of at as low as £70. The charters of Chili produce during the first half of July are comparatively light, being 1600 tons only, and at an ordinary period would have excited the demand, and enabled holders to obtain rather better rates; but as yet it has failed to produce the slightest salutary effect. The prevailing opinion is still against prices, and it is certain that unless orders come forward larger than at present lower rates must be conceded; but as the Indian Exchange has slightly recovered, this may induce shipments of manufactured to these parts, and consequently arrest any further downward tendency for a time. Smelters are willing to take £28 for 4 by 4 sheets, and perhaps something less for large quantities. Chili bars are obtainable today at £70, but holders, in some instances, ask 10% more. Lead.—The market is very quiet, and sales of any magnitude difficult to effect. English is obtainable at £20. 5 to £20. 10 per ton; Spanish, £20 to £22. 2/6. Speculation in this metal the amount of business reported is of a trifling character, and at prices somewhat below those formerly quoted. Rhenish and Silesian, to arrive, have realized £22. 2/6. Hard has changed hands from £17. 10 to £17. 15/8. At public auction, on Thursday, 120 tons of zinc were sold at £26. 10 to £26. 12 1/2. Quicksilver.—The inquiries for shipment to the East continue limited; but as nearly all the Italian iron market has been sold, importers of Spanish have advanced their price to-day to £8. 10/8. Tin Plates.—As the most pressing lots have been cleared off, prices have slightly recovered their late fall, and common cokes are now quoted 20 per box. Tin.—The smelters have made reductions in English to the extent of about £2 per ton; but the orders are far from plentiful, and mostly for very small quantities. The present price does not appear to present any inducement for buyers to take more than for existing requirements. Improved tone for foreign descriptions, and Straits and Australian have participated to the extent of 10 per ton."

#### Latest Liverpool prices are:

Iron: f. o. b. in Liverpool, per ton.	£	s.	d.	¢
Merchant bar, in England	6	15	0	0
Merchant bar, in Wales	6	5	0	0
Staffordshire	7	7	0	0
Hoop	8	0	0	0
Sheet	10	0	0	0
Nail rod	7	10	0	0
Bar, best crown	7	7	0	0
Boiler plates	9	15	0	0

#### Tin Plates: f. o. b. in Liverpool, per box.

	£	s.	d.	£	s.	d.
Charcoal, I. C.....	1	4	6 @	1	6	6
Coke, I. C.....	1	0	0 @	1	2	0

#### Copper: Delivered in Liverpool, per ton.

Bolt and Sheathing	£	s.	d.	¢
Tile	76	0	0	0
Tough cake	75	0	0	0
Best selected	76	0	0	0

#### Centennial Notes.

##### JONAS, METER & COLVER,

of the Continental Steel Works, Sheffield, exhibit a case of their finest crucible tool steel at B. 10, Machinery Hall. In a careful examination of this display our iron and steel men cannot fail to observe the extraordinary fineness and density of the fractured steel, which is made from the most celebrated brands of Swedish iron. The specimens shown were made at Attercliffe, Sheffield (cast steel was first made at Attercliffe 100 years ago, by the inventor, Benjamin Huntsman), by the crucible process, and it is claimed by those holding the highest reputation in the trade that the finest

qualities can only be obtained by this process. In proof of the superior quality of steel made by this firm, we are informed that when one of our most eminent manufacturers of machinists' tools was entering into a contract with the German government to supply its armory with tools, it was stipulated that this steel should alone be used. It is claimed that the tools made from this steel will turn the hardest chill, and in consequence it is much used for large milling cutters. The tools made from this steel are said to retain their cutting edge to the last, so that, although the first cost may be rather high, the less frequently the tool needs replacing the greater the saving effected, as the labor involved in making the tool is the most important item of expense. These are the chief points upon which the exhibitors base their claim to superiority, and upon which this class of steel maintains its reputation throughout England, France, Belgium and Germany for lathe tools, taps, dies, reamers, chisels, punches, &c. M. Diamond & Co., Hartford, Conn., are their principal agents for this country and Canada.

#### The Worshipful Ironmongers' Company.

Of the famous guilds of London that of the Ironmongers' Company is historically not one of the least conspicuous. We are accustomed to look to this age as one of centralization, but in 1462, when the Ironmongers' Company was incorporated by letters patent, though it had existed previously as a voluntary association, the ironmongers of London held in their hands the threads of a large portion of the home and foreign trade of the kingdom, most of their iron, which was chiefly obtained in the Forest of Dean, being wrought for them in the wealds or forges of Sussex, Surrey and Kent. The privileges accorded to them by Edward III. were confirmed and extended by several succeeding monarchs. Through them the English army and its mercenaries engaged on the Continent were supplied with arms and accoutrements, the former including, in earlier times, daggers, black bills, pikes and sheaves of arrows, and the latter, back and breast plates, gorgets and corselets. Among the assessments made upon the Guild by Royal or Parliamentary authority, as recorded in the books of the company, we find "Yron for the navie," also soldiers for the army. They, as with other city companies, were applied to from time to time to replenish the funds of the exchequer or to fill up the privy purse. One of the heaviest assessments was that made by the Parliament of 1643, amounting to no less a sum than £20,000, and compelling the Guild to sell its plate. Notwithstanding the special privileges the London Ironmongers had acquired, their business was encroached on from time to time by the energy and enterprise of country manufacturers and traders, and Stowe writes, of "the synths of the wealds of Gloucestershire and other merchants bringing down Irons of wheels for carts to the citie of London to the great loss and scandal of the trade of ironmongers." The consumption of the woods of Sussex, Surrey and Kent for feeding the forge fires, led to an act being passed in the third year of Queen Elizabeth "touching Yron Milles neere the citie of London and the verdure of the Thames," which prohibited the erection of any more "milles" within 22 miles of the metropolis. One of the great works undertaken by the London Ironmongers was the casting of the iron rails of St. Paul's Cathedral, effected at Lamberhurst, Kent, at a place still known as "The Furnace."

A London guild in olden times was nothing without its trade pageant, and the ironmongers, to do them justice, liberally assert, before crowds of citizens and country people, who flock at such times to the city, the majesty of the "arts and mysteries" of their trade. In one of these appeared the forge of Vulcan, with the smith of Lemnos at work, surrounded by servitors with black hair and leather aprons, and as the blows fell and the sparks flew, they sang songs in praise of iron, the anvil and the hammer. In another pageant appeared a temple with 12 silver columns, with figures of Titan, Apollo, Flora, Ceres and Victory, the latter clad in mail of burnished gold, holding a sword and wearing a helmet supporting a tower. A vast "golden" ostrich appeared with a horseshoe in his mouth. In addition to a virgin with lamp and bell and sea chariots of iron, there appeared, as a crowning piece, Mount Etna, with Vulcan and Cyclops at work within a cavern at the base—some laboring at forges, others digging the metal. On the occasion of Sir William Draper, a member of the Guild, being made Mayor in 1566, a goodly sum was spent on the "river spectacle" at night, a galley with two masts and ten oars being freighted with 2 1/2 barrels of gunpowder and squibs and crackers, the whole being fired off by "green men" habited as savages and carrying torches, the demonstration being responded to by a cannonade from each side of the banks.

Notwithstanding many enforced exactions for the French wars and other purposes, the members of the Guild were ever forward in the display of loyalty. Thus, in 1541, notwithstanding that Henry VIII. had compelled them to pledge their plate to add to the contents of his privy purse, they contributed a sum of £11. 18/10 to fit out a barge to accompany Anne Boleyn from Greenwich to Westminster, stocking it with good cheer consisting of "1 kilderkin of wine, ling, fresh salmon, great eels and various other refreshments." On the occasion of "fetching" Queen Elizabeth from the Tower to Westminster in 1558, they thought little of spending for the same purpose the sum of £24. 18/4. Their charities were at times very great. Thus in 1553 they expended a large sum of money, in consequence of a scarcity of corn, in bringing up a large quan-

tity from the country and retailing it at below cost. Many charities were founded at different periods in consonance with the wishes of donors, who had left lands, houses and money for the purpose to the Guild. The ironmongers, as we have indicated, were merchants as well as traders. Stowe writes that "They had large warehouses and yards where they exported and sold bar iron and iron rods; they had also shops wherein they displayed abundance of manufactured articles which they purchased of the workmen in town and country, and of which they became general retailers."

The guild has had successively its hall in All-ballows, Staining (rebuilt by Queen Elizabeth), in Ironmonger Lane, a locality which was long the headquarters of business, and in Thames street, on land given by Sir Charles Draper for the purpose in 1566. The guild was always famed for its hospitality, and it may interest our readers to know something of what was set before its guests in 1718. The provision for entertainment embraced, among other articles, four barrels of oysters, a goodly number of geese, turkeys, partridges, larks, with roast lamb, giblet pies, 12 lbs. of comfits, Banbury cheeses, spiced bread; and for potatoes, Gascon wine, red and white port, and Canary rum. Of old there was more feasting than speechifying at these banquets, and we are left without a record of the good things said, but it speaks much for the conviviality and sense of humor of the wardens and brethren, that one John Henley was paid by them "for playing on the tongue," 10/.

The guild was at all times conspicuous for its charities, and among these was the expenditure in 1723-4 of "half the interest and profits" of its possessions for the ransom of British subjects who were captives in Barbary and Turkey.

The arms of this company are argent, on a chevron gules, between three gads of steel azure; as many pairs of shackles or crest on a helmet tress; two salamanders combatant proper, chained and collared or; Legend: "God is our strength." These arms were granted to the London Ironmongers in 1435, before their incorporation by Lancaster, then King of Arms, and were confirmed by royal authority in 1530. The original salamanders which were selected on the supposition that like iron they are unburnt by fire, came in time to be called lizards, and the Irish estate of the company is known as the Manor of Lizard.—*Iron Trade Exchange.*

#### Railway Resistances.

An interesting report on this subject was made at the recent meeting of the American Institute of Civil Engineers, by a committee consisting of Messrs. W. P. Shinn and P. H. Dudley. Of this report the *Railway Review* makes a most interesting synopsis. It is self-evident that it takes more force to pull a given train over a rough road than over a smooth one, and that it makes considerable difference whether a train is moving over a horizontal or an inclined track, straight or curved, and whether the journals are properly or improperly lubricated. These, with many other conditions must enter into the question of how much force is required to move a train of a definite weight between two given points. The question is an economical one of no little importance in these days, when the grand desideratum is to reduce the cost of transportation. The *Review* says:

In order to ascertain how many foot pounds were necessary to move a train of given dimensions, Messrs. Shinn and Dudley used a very ingenious contrivance called a dynagraph (the invention of the latter gentleman), attached to the car next to the locomotive. This instrument consists of a steel cylinder filled with oil into which is fitted a cylinder, to the piston of which is attached the draw bar of the car. The varying degrees of force exerted upon this draw bar are communicated to the piston and through that to the oil, which in its turn impresses the force upon a series of springs of known tension. These springs are attached to a recording apparatus something like that of an anemometer, by which a pencil records the speed and the actual force used. By this means it can be ascertained at any place on the road passed over how many foot pounds were required, and, of course, how much fuel was used. These dynagraph records have been made throughout the entire length of the Lake Shore and Michigan Southern Road, from Buffalo to Chicago, and the data are being worked out. Some of the results already arrived at are of curious interest. It is ascertained that there is a great waste of power caused by stoppages, requiring extra consumption of fuel to overcome the inertia of the train. In one case it was found that 125 pounds of coal were consumed in merely starting a train. The amount of force is readily found by dividing the force registered on the dynagraph by the number of foot pounds of force developed by a pound of coal, which in the case of the engine used was 296,545 pounds. The dynagraph was so sensitive that it recorded every movement of the lever of the throttle valve, of the reversing lever, and even the opening of the cylinder cocks. Even the resistances of the track caused by heavy moisture are readily indicated and recorded. It was found that a large outlay of extra force is frequently necessary on account of defective or poor lubrication. In one case where the oil had become mixed with particles of brass worn from the bearings, when fresh oil was turned into the boxes the power required to move the train was decreased from 10 to 20 per cent. Another interesting conclusion arrived at is that fuel is saved by running heavy freight trains at a speed of from 18 to 20 miles per hour rather than at the usual low speed of 12 miles per hour. Of course, as a question of economy, it may be found that the extra wear of the road and the rolling stock will balance or exceed the

saving of fuel. But it seems to have been settled that light gradients are overcome much more easily by an increased velocity just before attempting them.

These investigations also show a great waste of power caused by the depression of the ends of rails. These depressions are not noticed by passengers on account of the excellent springs of the passenger coaches; but the dynagraph gives immediate and reliable notice that a great increase in the consumption of coal is necessary to overcome the jolts caused by such defects in the track. The experiments so far made by the dynagraph indicate that this new field of investigation will develop some very important results in the operation of railways and the saving of unnecessary cost in the department of transportation.

#### Iron against Wooden Ships.

In a recent issue *Iron* has the following article in which it discusses the advantages of iron ships, and the value of wooden sheathing for them:

Is an iron built ship more liable to receive damage on taking the ground than a vessel constructed of wood? This problem seems to have engaged considerable attention in the United States, and the conclusion arrived at by the Council of the Underwriters' Association is, that vessels wholly built of iron are unsafe risks unless they are exteriorly sheathed with wood. This will astonish engineers and shipbuilders in this country, says the *Shipping and Mercantile Gazette*, who have so long insisted upon the inferiority of wood as a building material when compared with metal.

The late Mr. Grantham, in his book on "Iron Shipbuilding," claims especially for iron that a properly built ship will bear greater strains than one constructed of wood. In Fairbairn's work, tables of results are given from actual experiments, and it is shown that a wrought iron plate only three-quarters of an inch thick is able to resist a force equal to that required in the rupture of a 3 inch oak plank. The strength of dry English oak to resist a crushing force is 4.24 tons to the square inch, whereas wrought iron requires a pressure of about 31 tons to the square inch. The resistance of wrought iron plates to a force calculated to burst them follows a law different to that of oak, the resistance being directly as the depth, and of the latter as the square of the depth. It has been held by several writers that an iron built ship will bear a greater strain than a wooden built one when the hull is resting on unequal ground. The timber joints of a ship are not united either longitudinally, vertically or transversely, and the strength depends upon the sheathing which is attached to the ribs, whereas the plating of an iron vessel is made homogeneous by the riveting and laps. When the Great Britain was exposed for a whole winter to the action of the sea, stranded in Dundrum Bay, the advocates of iron instanced the case as a proof of the value of a vessel with a metal bottom to resist contact. Another ship was put to rather a severe test on the 7th of April last, when Malta was enfeebled by the Prince of Wales. The Indus with the outward Indian and Australian mails, when nearing the island, bumped several times on the Monsiear Reef, at the extremity of St. Thomas' Point, remained fast by her heel for some time, but eventually swung round and got off. St. Elmo Light was established to guard vessels from running on to that dangerous reef, but a magnesium light, it is said, caused the mate to mistake his position. The ship, however, having called at Malta, proceeded.

There has been an almost unanimous chorus in favor of iron for shipbuilding, partly from its alleged immunity from breaking when resting on uneven ground. There have, however, been recorded instances of iron built ships snapping in two directly they struck, and it was said of the Royal Charter that "she broke like a tobacco pipe." The weight of the boilers and machinery must always prove a source of danger to either iron or wooden built ships, because the mass, when receiving a sudden jerk, will exercise its force on the frames, keelsons and plating. The boilers, furnaces and bedding plates are not compactly stowed like cargo in a ship's hold, but are, to a great extent, held in suspension, and the dead weight, when brought down as a hammer on the hull, by the vessel striking, is bound to exert its influence. There have been persons in England, however, who have expressed an opinion in favor of wooden steamers in resisting strains on being left dry at low water, or on striking on shoals.

The American Underwriters' Association have turned their attention more particularly to lake navigation, where iron-built screw steamers have very much increased within the past few years; and to obtain greater security from the dangers arising in passing through canals or rivers, the following, among other rules, has been issued: "Steam vessels built of iron, not less substantially than required by the Rules of the New York Record for the highest class, but, in addition, having their bottoms built as solidly and defensively as those of modern steam vessels, being timber-filled between the frame of the floor, the filling in whole length well fastened to the floor plates, the bottom outside planked with wood to the top of the bilge, the planks of three-fourths the thickness required for wooden vessels, single fastened and properly caulked, with watertight ceiling to the top of the bilge, and three or more compartment bulkheads well caulked, shall be eligible to the grades of the first-class for lake navigation. Iron vessels inferior to the above standard of strength and preparation for taking the bottom, to be assigned a grade in the second or third-class only."

All iron built steamers plying on fresh water rivers or lakes would, by this regulation, have to be sheathed outside with wood and filled up inside with timber. The pretentious claims of

iron ships, it is said, have been found out, and now they are in consequence discredited. Iron when covered with wood cannot be efficiently protected from leakage; therefore, if the plates both inside and outside cannot be got at to coat with paint, wherever water insinuates itself decay will be going on by corrosion. If this rule of classification is acted upon by underwriters a great blow will be inflicted upon the building of iron ships in Canada and the United States. Iron built paddle wheel and screw vessels have been introduced on the Mississippi and other rivers most successfully, and, so far as experience goes, they are worked more economically than wooden built steamers. The extra weight of hull caused by the wood which the iron would have to carry is a serious objection; the displacement being increased, the consumption would be augmented proportionately. The Committee of Lloyd's Register have never attempted to make the owners of iron built river, lake and coasting steamers double the bottom of their vessels by wooden sheathing. They require all iron ships to be closely ceiled from the main keelson to the upper part of the bilges, and from there upward with either batten and space or close ceiling. By rule 35, also the frames and plating of the bottom of all vessels in the upper part of the bilges have to be thickly and efficiently covered with Portland or other approved cement, mixed with sand, to the satisfaction of the surveyors.

The shipowners are opposed to this addition of so many tons of material on the hulls of their vessels, submerging them a foot or more, and the subject is receiving considerable discussion in Canada and the States. Numerous letters and fly-sheets have been published, and among the contributors to the controversy is Mr. D. Bell, of Buffalo, who supplies statistics relating to the iron built propellers belonging to that port. Action was taken against iron steamers because of the loss of the Merchant (iron) last year. This vessel was built in 1862, and her owners had never made any claim on the underwriters until she was lost at Racine. During her existence of 13 years her owners paid \$30,907 on insurance of hull and outward cargo, and recovered from the underwriters \$28,782. The insurers also received about \$6000 on policies for westward cargoes. The ship returned in gross premiums to the underwriters a profit of \$7125 according to this representation. Ten other iron steamers now in existence, and built at a cost of \$330,000, are mentioned, and including the Merchant, or 11 vessels in all, the sums paid to underwriters were \$188,045, and recovered underclaims \$79,025, leaving as the gain to the insurers \$109,012. This is the practical experience elicited, in an underwriting point of view, on the losses and gains in the working of 11 iron built steamers in lake navigation. The underwriters say that their earnings do not correspond with the risks undertaken, and the shipowners declare that, if they had been their own insurers, they might have added five new ships to their fleet. The underwriters, on the other hand, draw a distinction between premiums on ships and premiums on cargo, and say that, taking the premiums on the vessels and freight money only, the consideration is too small, and that further protection is needed.

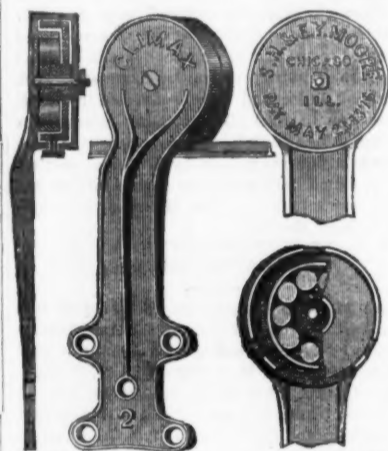
Shipowners, it would seem, take the premium as a whole, and the underwriters look at them in detail.

**Steel Belting.**—Dr. William Fields, of Wilmington, Del., has applied for a patent for steel belting. The Wilmington *Republican* says: "Any good tough steel will answer the purpose. The great superiority of steel belting over that of leather is first its cheapness, not costing by one-third as much as that of leather; second, it will not stretch or get out of shape; third, it is quickly made, as there is an inexhaustible supply of the crude material in this country. Steel can be made at two and a-half cents per pound, and rolled into belting for two and a-half cents more. It doesn't require to be more than a sixteenth of an inch in thickness for most of the belting, consequently it will not weigh much per foot. The Doctor's process for slackening and tightening the belts in a few seconds, without disturbing the joinings, is also a great advantage over the strings and facings now in use. The invention is an important one, and calculated to be of great service to manufacturers."

Some days ago, Messrs. John H. Thompson & Co., of 32 Pine street, New York, sent 100 tons of pig iron by rail to Virginia City, Nevada. As the cost of freight is said to have been about double the value of the iron at the time of shipment, this shipment may be regarded as one of the curiosities of the iron movement.

### S. H. & E. Y. MOORE, CHICAGO, ILL.,

AGENTS FOR  
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Thrashing Machine Teeth, Cold Pressed Nuts, Chain Links, Ship Chandlery, &c.  
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### "CLIMAX" Barn Door Hangers,

Manufactured and for sale by  
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The wheel is acted upon directly by the rail. The hub of this wheel revolves within chilled iron rollers. The difference between the diameter of the wheel and the diameter of the hub gives the leverage gained. The hanger has the advantage of this leverage in addition to that obtained from the use of anti-friction roller bearings, and in this respect, as well as in others apparent on examination, is superior to any yet offered to the trade. It requires no oiling.

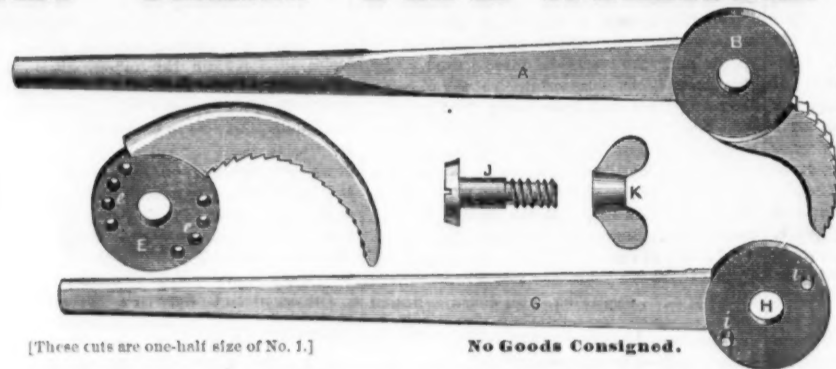
IT COMBINES  
SIMPLICITY, EASE OF ACTION, STRENGTH,  
DURABILITY, BEAUTY OF DESIGN.

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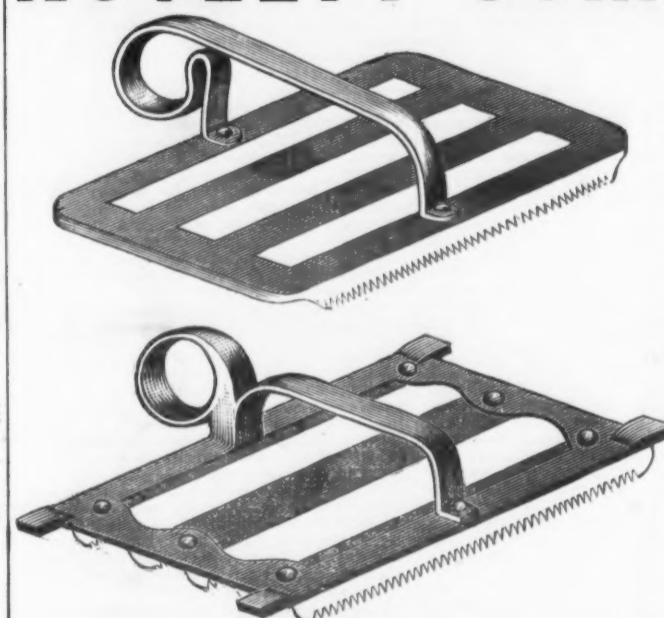
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Upright Sausage Stuffers.  
(Forschner's Patent.)  
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THIS CUT ILLUSTRATES THE GRASPING OF THE COMB.



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These Combs do not injure upon the rights of any one. They are the simplest, Neatest and Most Durable CURRY COMBS ever offered to the trade, affording an easy grasp for the hand, without the use of the ordinary side handle, and are universally acknowledged to be superior to all others. They are neatly put up in paper boxes of one dozen each, and packed 24 dozen in a case. Special net prices furnished on application. Sample and Warerooms with GRAHAM & HAINES, 113 Chambers Street, N. Y.

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JAPANNED AND PATENT BRIGHT METAL

### Bird Cages.

Received the  
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### J. CLARK WILSON & CO., Manufacturers and Jobbers of Hardware,

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### THE COTTAGE FLY TRAP.

It has Won the Praise of Thousands.



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The experience of last year warrants us in fully recommending it as THE BEST FLY TRAP IN THE MARKET. It surpasses all others in catching flies, its capacity for doing so being FOUR TO SIX TIMES GREATER than the so-called "Cone Traps." It is compact, and its construction is so simple that a child can bait and manage it. Its price is low as compared with all others. A trial will convince any one that it has no superior. PUT UP IN BOXES OF ONE DOZEN EACH.

PRICE PER DOZEN, \$6.00.  
Special prices made to large dealers. We solicit your orders.



### The Old Reliable Pioneer Poke.

The only Poke made with an oil tempered Cast Steel Spring. Our Pokes are manufactured under the personal supervision of the proprietors themselves, from the very best selected Oak and Hickory Timber, and finished in the very finest style. We warrant our goods to be first-class in every respect. For further particulars and price please address

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# L. COES' Genuine Improved Patent SCREW WRENCHES.

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We invite the particular attention of the trade to our New Straight Bar Wrench, widened, full size of the larger part of the so called "reinforced or jog bar." Also our enlarged jaw, made with ribs on the inside, having a full bearing on the front of bar (see sectional view), making the jaw fully equal to any strain the bar may be subjected to.

These recent improvements in combination with the nut inside the ferrule firmly screwed up flush, against square, solid bearings (that cannot be forced out of place by use), verifies our claim that we are manufacturing the strongest Wrench in the market.

We would also call attention to the fact, that in 1869 we made several important improvements (secured by patents), on the old wrench previously manufactured by L. & A. G. Coes, which were at once closely imitated and sold as the Genuine Wrench by certain parties who seem to rely upon our improvements to keep up their reputation as manufacturers, and although the fact of their imitating our goods may be good evidence that we manufacture a superior Wrench, we wish the trade may not be deceived on the question of originality. Trusting the trade will fully appreciate our recent efforts, both in improvements on the Wrench and in the adoption of a Trade Mark, we would caution them against imitations. None genuine unless stamped

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## GOLD MEDAL Non-Extensible Razor Belt.

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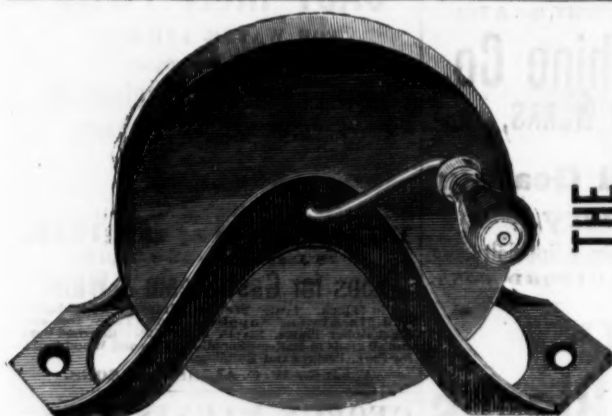
In this Strap the liability of the leather to stretch and become loose and porous is prevented by the use of a patented non-extensible base, which supports the leather and secures

**PERMANENT ELASTICITY.**

We make this style with single rod, double rod, and wood frames, and intend that it shall, in quality compare favorably with our other well known brands.

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**THE GRINDSTONE   
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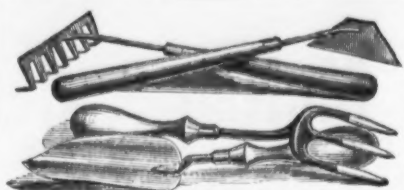
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This set of **GARDEN TOOLS**, is put up in a nice paper box, and is superior to any other in the market. The tools are made of the best quality of Steel, highly polished, and of malleable iron polished or painted, with birch handles. We will make it an object for every dealer to handle them.

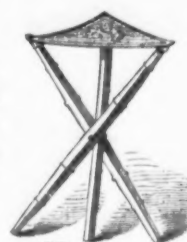
**PRICE \$15, PER DOZEN SETS.**



### CENTENNIAL CHAIR.

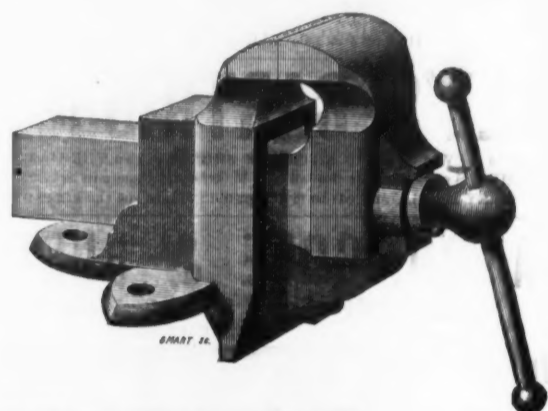
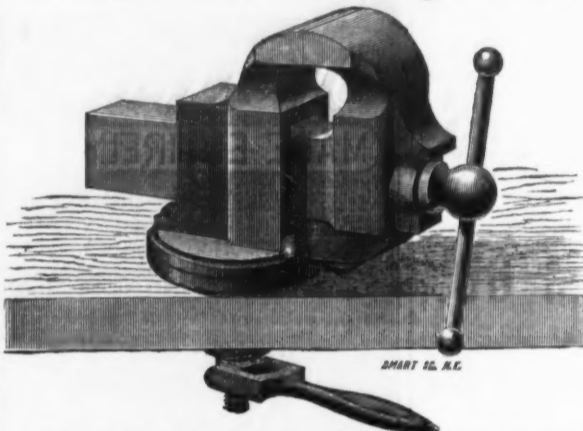
This Chair is made of the best second growth White Ash, finished on the wood, with Brussels Carpet Seat. It shuts up to the size of a single chair post, and weighs only one pound. Every person who forgets to take one with him when he goes to the Centennial, will be sorry when he gets there, as no chairs are provided for visitors, and they get very tired. Every store in the land can sell a few of them at a profit. They are a very popular article here.

**PRICE, \$12 PER DOZEN.**

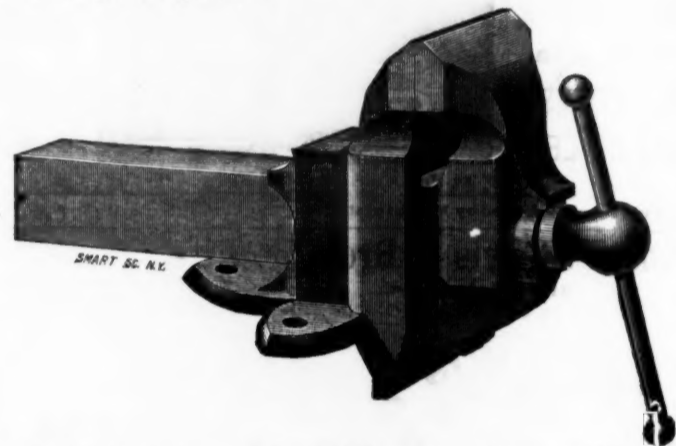
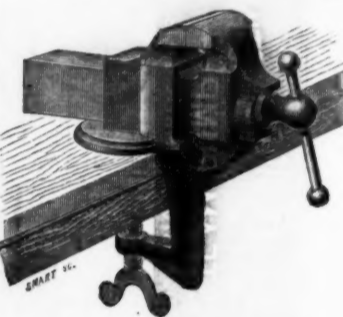


**MILLERS FALLS CO., 74 Chambers St., N. Y.**  
Corner BROADWAY.

## Simpson's Adjustable Parallel Vises.



The Jaws can be instantly opened or closed the full length, by one movement of the hand, without the use of the screw. They combine the **QUICK ADJUSTMENT** with all the advantages of the best Screw Vises, holding the work with as slight or firm a grip as may be desired, without any liability to jar or work loose, as is the case with other adjustable vises. The Screw being used merely to give the grip, they will outwear any Vises in market.



Their extreme simplicity constitutes one of their strongest recommendations.

Send for Price List.

**BAILEY WRINGING MACHINE CO., Sole Agents, 99 Chambers Street, N. Y.**

## THE EAGLE ANVIL !! WARRANTED !!

(ESTABLISHED) 1843.



These Anvils are superior to the best English, or other Anvils, on account of the peculiar process of their manufacture (invented and used only by this concern), and from the quality of the materials employed.

The best English Anvils become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.

The body of the Eagle Anvil is of crystallized iron, and no settling can ever occur; the steel face, therefore, remains perfectly true. Also, it has the great advantage that being of a more solid material, and consequently with less rebound, the piece forged receives the full effect of the hammer, instead of a part of it being wasted by the rebound, as of a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a hammer one-fifth lighter than that required when using a wrought iron anvil.

The working surface is in one piece of Jessup's Best Tool Cast Steel, which, being accurately ground, is hardened and given the proper temper for the heaviest work. The horn is covered with and its extremity made entirely of steel. The body of the Anvil is of the strongest grade of American iron, to which the cast steel face is warranted to be thoroughly welded and not to come off.

**NEW PRICE LIST.** ANVILS of 100 lbs. to 800 lbs., 10c. per lb.

Small Anvils, ("Minims.")	No. 0	1	2	3	4	5	6	7	8	9
Weighting about	10 lb.	15 lb.	20 lb.	30 lb.	40 lb.	50 lb.	60 lb.	70 lb.	80 lb.	90 lb.
	\$2.50	\$3.25	\$4.00	\$4.75	\$5.50	\$6.25	\$7.00	\$7.75	\$8.50	\$9.25

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**HOWARD PARALLEL BENCH VISE.**  
MANUFACTURED BY  
**Howard Iron Works,**  
Send for price list. **Buffalo, N. Y.**  
RUSSELL & ERWIN MFG. CO. NEW YORK & PHILADELPHIA AGENTS.

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Hunting, Short and Long Range Target Rifles.  
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Revolvers. Send for Reduced Price List.

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CREEDMOOR, 32-100 REVOLVERS.

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COLT'S ARMY REVOLVER 45-100, adopted by Texas, the United States, and other  
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JOB LOT OF SWAMP ANGEL DERRINGERS.

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SHELLS can be procured of all Gun Makers and dealers in Ammunition in the United States.  
ELEY BROS. (Limited) have not granted to any one the *Exclusive* sale of these Shells.

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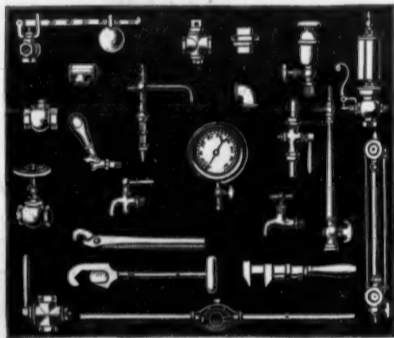
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COMBINING SIMPLICITY AND DURABILITY TO A  
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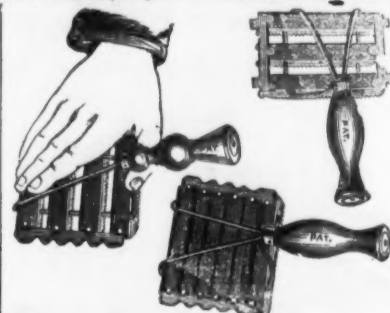
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while using the comb. The wire braces which run from  
the shank over the back to the front teeth give strength  
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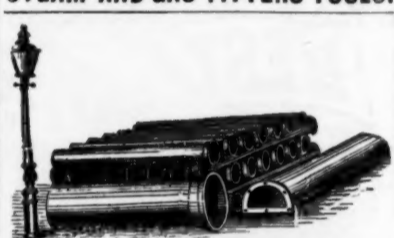
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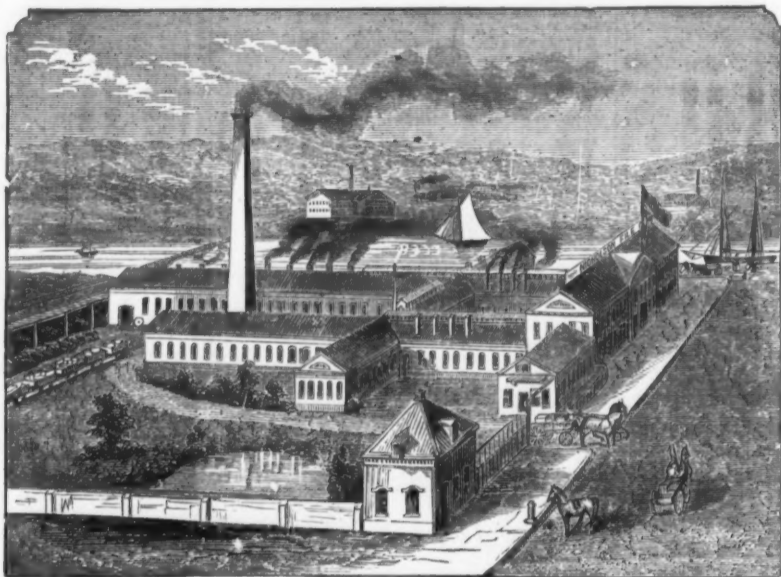
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For cutting circles or washers out of leather, rubber, paper or thin wood. It will cut any size up to 6 in. diameter, and can be used in an ordinary bit-stock.  
 Price \$2.50 per dozen.  
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FOR THE FOLLOWING REASONS:

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 ESTABLISHED 1848.  
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 ESTABLISHED 1866.

**FIRE BRICK**  
 of reliable quality for all purposes, manufactured of the best New Jersey Fire Clay. Also, ROCKINGHAM WARE, YELLOW WARE, Fire Clay, Fire Sand, Kaolin Ground Fire Brick, and Diamantine Building Brick.

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**BUSH PATENT**  
**Centrifugal Pump.**

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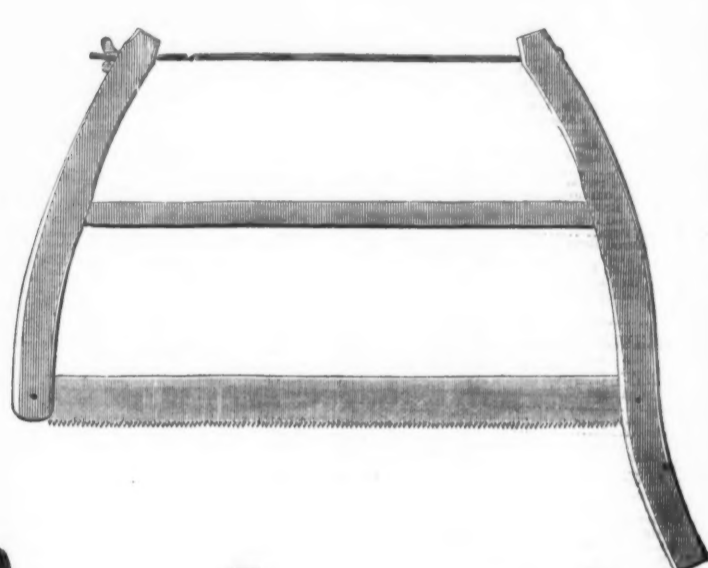
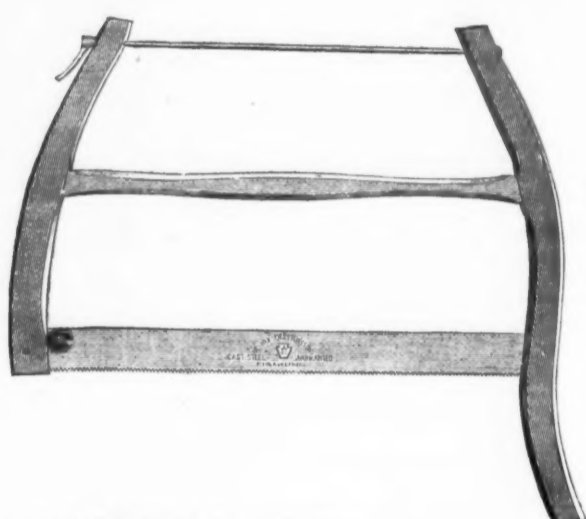
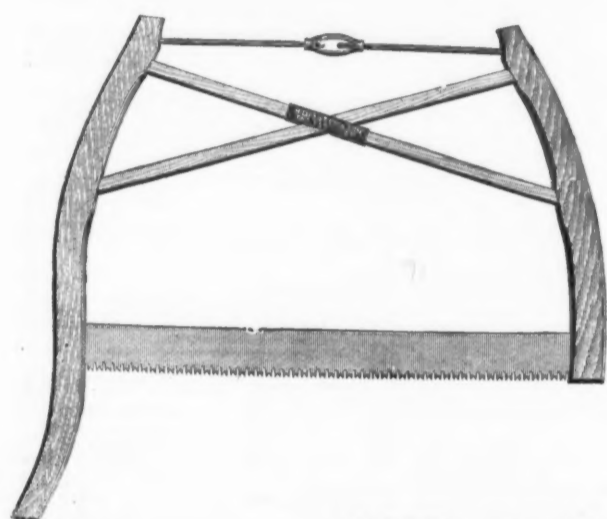
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**PATENTS,**  
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 AND MARBLE BUILDINGS  
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 H. HOWSON, Solicitor of Patents. C. HOWSON, Attorney at Law.  
 Communications should be addressed to the  
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Front and Laurel Streets, Philadelphia.

## HENRY DISSTON & SONS, IMPROVED CROSS-CUT AND WOOD SAWS.



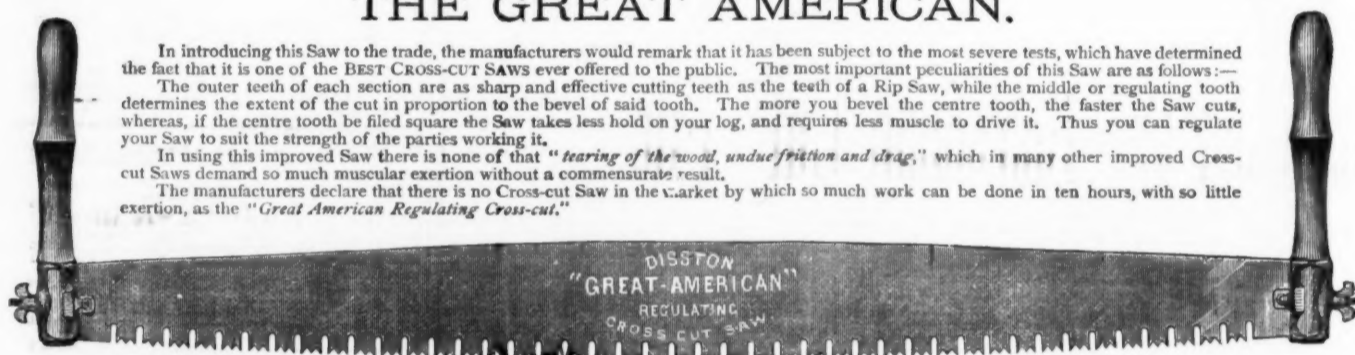
### THE GREAT AMERICAN.

In introducing this Saw to the trade, the manufacturers would remark that it has been subject to the most severe tests, which have determined the fact that it is one of the BEST CROSS-CUT SAWS ever offered to the public. The most important peculiarities of this Saw are as follows:—

The outer teeth of each section are as sharp and effective cutting teeth as the teeth of a Rip Saw, while the middle or regulating tooth determines the extent of the cut in proportion to the bevel of said tooth. The more you bevel the centre tooth, the faster the Saw cuts, whereas, if the centre tooth be filed square the Saw takes less hold on your log, and requires less muscle to drive it. Thus you can regulate your Saw to suit the strength of the parties working it.

In using this improved Saw there is none of that "tearing of the wood, undue friction and drag," which in many other improved Cross-cut Saws demand so much muscular exertion without a commensurate result.

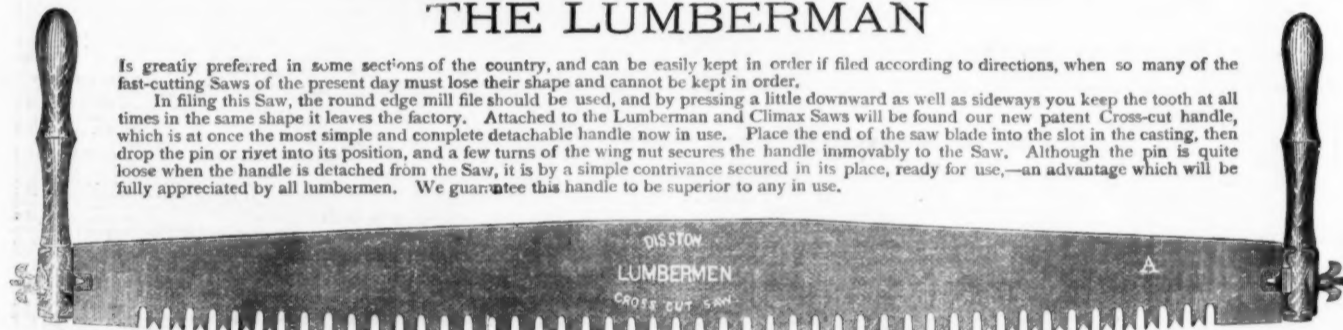
The manufacturers declare that there is no Cross-cut Saw in the market by which so much work can be done in ten hours, with so little exertion, as the "Great American Regulating Cross-cut."



### THE LUMBERMAN

Is greatly preferred in some sections of the country, and can be easily kept in order if filed according to directions, when so many of the fast-cutting Saws of the present day must lose their shape and cannot be kept in order.

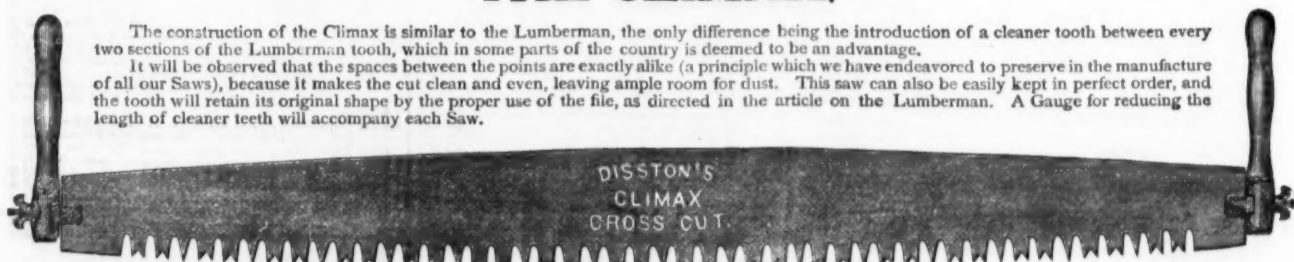
In filing this Saw, the round edge mill file should be used, and by pressing a little downward as well as sideways you keep the tooth at all times in the same shape it leaves the factory. Attached to the Lumberman and Climax Saws will be found our new patent Cross-cut handle, which is at once the most simple and complete detachable handle now in use. Place the end of the saw blade into the slot in the casting, then drop the pin or rivet into its position, and a few turns of the wing nut secures the handle immovably to the Saw. Although the pin is quite loose when the handle is detached from the Saw, it is by a simple contrivance secured in its place, ready for use,—an advantage which will be fully appreciated by all lumbermen. We guarantee this handle to be superior to any in use.



### THE CLIMAX.

The construction of the Climax is similar to the Lumberman, the only difference being the introduction of a cleaner tooth between every two sections of the Lumberman tooth, which in some parts of the country is deemed to be an advantage.

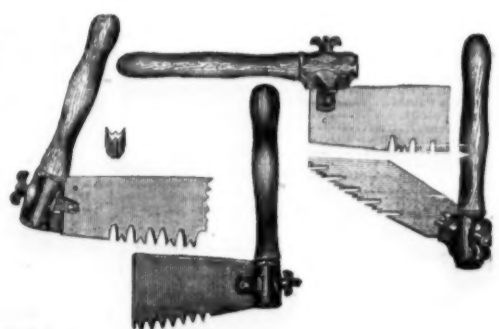
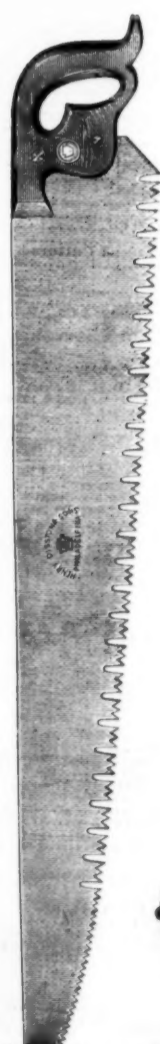
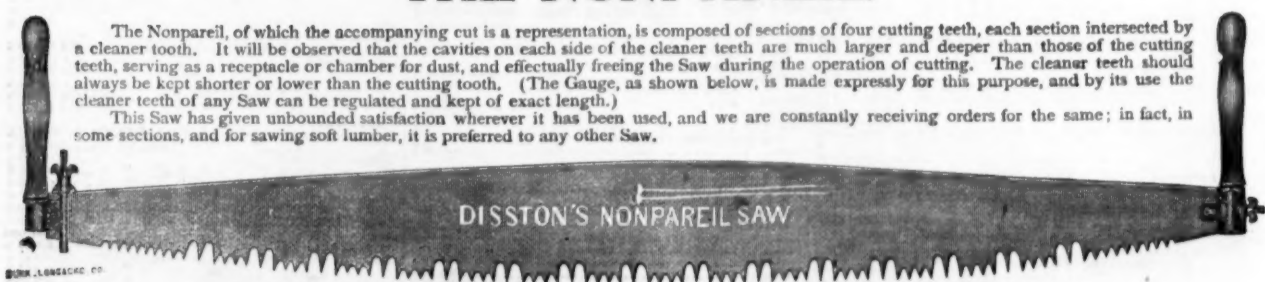
It will be observed that the spaces between the points are exactly alike (a principle which we have endeavored to preserve in the manufacture of all our Saws), because it makes the cut clean and even, leaving ample room for dust. This saw can also be easily kept in perfect order, and the tooth will retain its original shape by the proper use of the file, as directed in the article on the Lumberman. A Gauge for reducing the length of cleaner teeth will accompany each Saw.



### THE NONPAREIL.

The Nonpareil, of which the accompanying cut is a representation, is composed of sections of four cutting teeth, each section intersected by a cleaner tooth. It will be observed that the cavities on each side of the cleaner teeth are much larger and deeper than those of the cutting teeth, serving as a receptacle or chamber for dust, and effectually freeing the Saw during the operation of cutting. The cleaner teeth should always be kept shorter or lower than the cutting tooth. (The Gauge, as shown below, is made expressly for this purpose, and by its use the cleaner teeth of any Saw can be regulated and kept of exact length.)

This Saw has given unbounded satisfaction wherever it has been used, and we are constantly receiving orders for the same; in fact, in some sections, and for sawing soft lumber, it is preferred to any other Saw.



**New York Wholesale Prices, August 9, 1876.**

## HARDWARE

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Table with 2 columns: Item Name and Price. Includes items like Blood's Excelsior and Granger, Young America, Wade's Grass, etc.

Table with 2 columns: Item Name and Price. Includes items like Sheaves, Shingling, R. & E. List, etc.

Table with 2 columns: Item Name and Price. Includes items like Shovels and Spades, Ames, Birmingham Shovel Co., etc.

Table with 2 columns: Item Name and Price. Includes items like Stacks and Dies, Hudsonian Stone, etc.

Table with 2 columns: Item Name and Price. Includes items like Squares, Steel, Iron, etc.

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Table with 2 columns: Item Name and Price. Includes items like Tapes, Measuring, American, etc.

Table with 2 columns: Item Name and Price. Includes items like Tea Trays, American, etc.

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PRATT & CO., Hardware & Iron Merchants, Buffalo, N. Y. BUFFALO FORGED HORSE NAILS. Orders solicited from the Trade. G. B. WALBRIDGE & CO., New York Agents.

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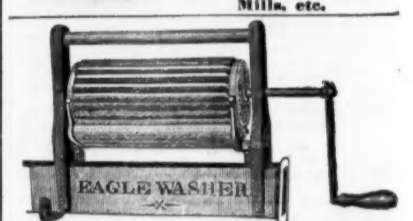
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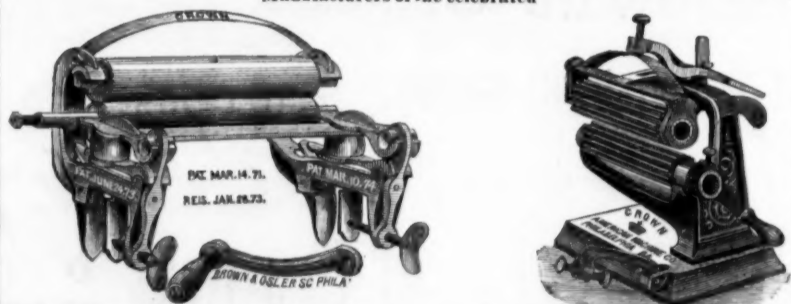
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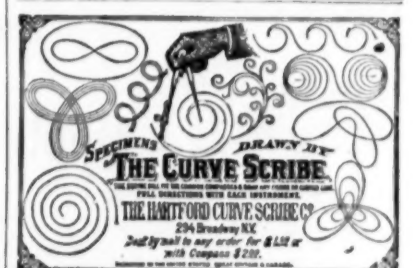
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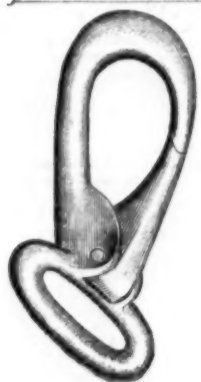
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Prices furnished upon application.**Lloyd, Supplee & Walton,**  
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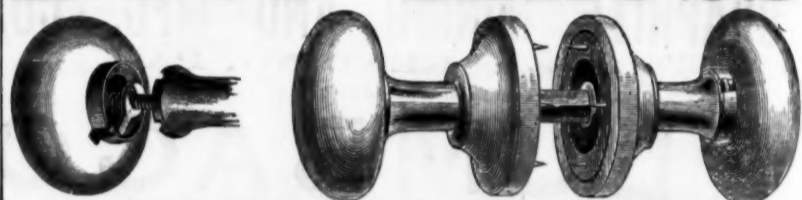
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Is the only perfect Door Knob Attachment ever invented.  
**AWARDED A BRONZE MEDAL**At the American Institute Fair, in New York, for 1874.  
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Four Sizes, - - Nos. 25, 30, 40 and 50.

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All New Patterns made at our own Works.

It has many **Essential Features** entirely different from anything in the **Market**. Its general appearance is very attractive; its beauty of **ornamentation** is unequalled; its **working-qualities** perfect; beside, its **smoothness of castings**, **perfect fittings**, **burnished edges**, **full nickel-plated trimmings** places it at the head of them all.

All doors swing out on a hinge, can be easily taken off to facilitate in blacking and cleaning the micas, and are provided with a **portable, nickel-plated Turnbuckle**, a new feature originating with us, as well, also, as the **Urn Ornamental Top**, which we claim **Letters Patent on**. **Nickle-plated Plate ornaments** the base of the Stove. Handle to dampers, number plate and even the heads of the rivets are all **nickel-plated**. The trade should not delay sending for a **sample stove** to insure their taking the lead in their respective localities.

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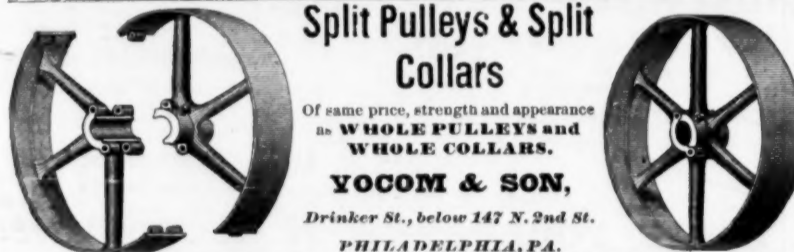
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Of superior Quality and Hardware Specialties in Malleable Iron made to order.

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Suspended Self-Indicating  
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Capacities from 1 to 100 tons.



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**JOHNSON'S PATENT UNIVERSAL LATHE CHUCK.**



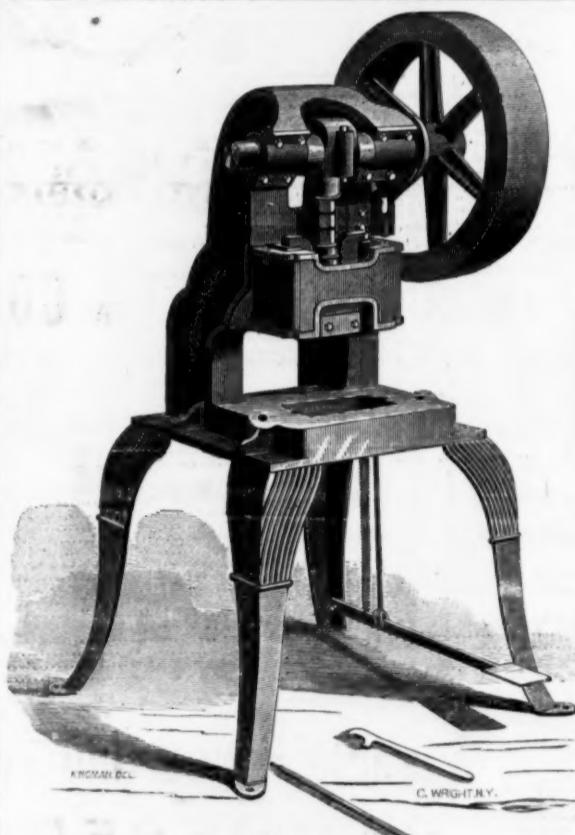
We invite attention to the superior construction of this chuck. Its working parts are absolutely protected from dirt and chips. It is strong, compact and durable, and will hold the greatest variety of work, as the jaws are adjustable with a range the full diameter of the chuck. For Price List address.

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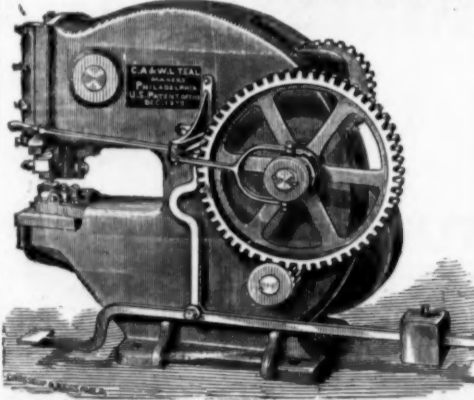
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SCALE AND TESTING MACHINE  
ESTABLISHED 1846

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Double Beam R. R. Truck Scale, Compound Parallel Crane Scales, &c. Patented First Power Lever Wagon Scales. Testing Machine and capacity bond for Illustrated Price List.



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**TEAL'S IMPROVED POWER PUNCH.**  
U. S. PATENT OFFICE, DEC., 1875.

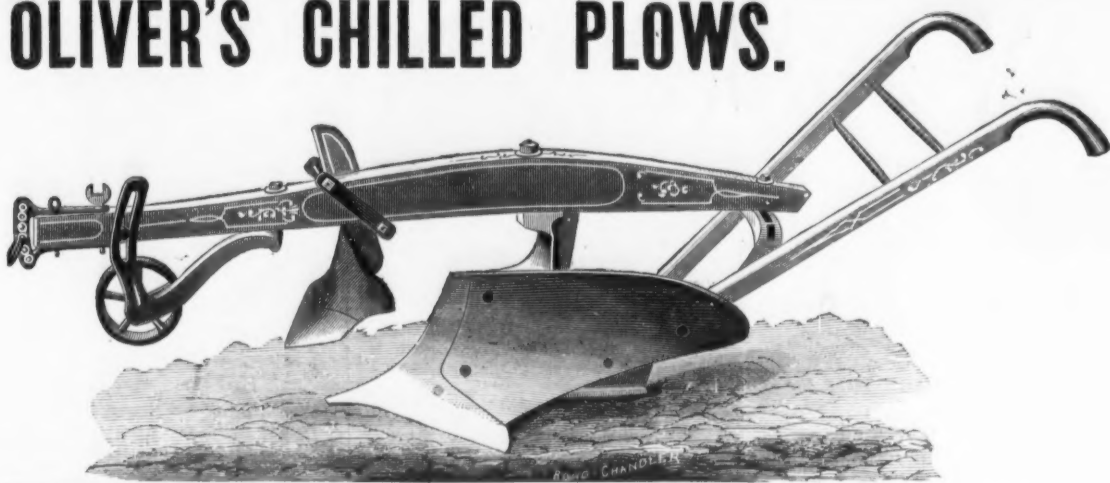


The above represents our new pattern of Single Punch. The "head" is worked by a lever with jaws in the back end, which carry a Cam-gear with "treads," one on each side of the teeth; underneath the Cam and on the shaft of the large gear is a Pinion, with treads corresponding to those on the Cam; as the Pinion revolves, the Cam rolls round upon it, the shape (of the Cam) being such that about four-fifths of the circumference are employed in raising the lever and the remaining one-fifth in dropping it, giving the head a slow downward and a quick upward motion. The advantage of this will readily be seen, as the friction of the Cam is rolling friction, except that of the pin on which it revolves; the motion being like rolling up an inclined plane. The bearings for the lever in the punch-head are provided with an arrangement for taking up the wear or lost motion, which avoids the necessity of repairing. The die-seat is capable of very accurate adjustment with the punch; and for boiler makers the machine is made small at the end on which the die-seat rests, for punching flanged heads, angle iron, &c. Punch Stripper is also adjustable to any thickness of iron.

These machines are provided with a loose and heavy fast pulley, and are made separate for punching, shearing plate and cutting off bar iron; and when desired, one machine can be furnished with attachments for all three purposes. Our regular patterns for Boiler Makers will punch 1 in. hole in 1 in. iron, shear 1 in. plate and cut off 1 1/2 in. bar iron, and will punch and shear in the center of 22 in. and 30 in. plate. Machines made to order for any kind of work, from the lightest to the heaviest.

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**CENTENNIAL SPACE, NO. 5027, SECTION C. 3, MACHINERY HALL.**

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These implements, though but four years before the public in their present form, show the following remarkable record:  
1506 were sold in the season of 1871. 7472 were sold in the season of 1873. 31,077 were sold in the season of 1875.  
3049 " 1872. 14,076 " 1874. 42,139 having been sold the past spring.

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No. 1, 22 Calibre; No. 2, 32 Calibre, Long Cartridge.



Cut Represents No. 2, 32 Calibre, 5 Shot. Size reduced one-third.  
Exact Model of S. & W. No. 1 and No. 1-2 Revolvers.  
These Arms are Half Nickel Plated and are equal in style of finish to the best Arms in the country. Quality of workmanship and material first-class; warranted. Price less than any other Hinge Barrel Cartridge Revolver of same quality in the market.

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THE VICTOR PLANES  
Are the most simple, compact and practical Adjustable Planes ever offered to the public. They are made under the personal supervision of Mr. L. BAILEY, the original inventor of L. BAILEY'S PATENT ADJUSTABLE IRON PLANES. All our Planes have our Trade Mark. Send for Catalogue, embracing Planes, Try Squares, Bevels, Rules, Levels, Hammers, Mitre Boxes, etc., etc.

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And all description of IRON AND STEEL  
Drop Forgings.  
Send for a Circular.

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FROM  
BENZON IRON.  
Orders promptly filled at lowest market rates.  
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35 Chambers Street, New York.

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MANUFACTURERS OF  
Pointed, Polished & Finished Horse Shoe Nails.

Recommended by over 20,000 Horse Shoers.  
All nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by

GLOBE NAIL CO., Boston, Mass.

Solder.—F. S. & Co.'s make			
Best Fine.....			190
No. 1.....			170
Roofing.....			150
Braziers or Solder Solder.....			70 to 100
Antimony.....			200
Babbitt Metal—F. S. & Co.'s.....			15
No. 2.....			140
Sheet Iron.....			
No. 24.....	3 1/2	Smooth.....	50
25 to 26.....	3 1/4	Common.....	40
27 to 28.....	3	No. 24.....	30
29 to 30.....	2 3/4	25 to 26.....	25
31 to 32.....	2 1/2	27 to 28.....	20
33 to 34.....	2 1/4	29 to 30.....	15
35 to 36.....	2 1/2	31 to 32.....	10
37 to 38.....	2 1/4	33 to 34.....	5
39 to 40.....	2 1/2	35 to 36.....	4
41 to 42.....	2 1/4	43 to 44.....	3
45 to 46.....	2 1/2	47 to 48.....	2
49 to 50.....	2 1/4	51 to 52.....	1 1/2
53 to 54.....	2 1/2	55 to 56.....	1
57 to 58.....	2 1/4	59 to 60.....	1
61 to 62.....	2 1/2	63 to 64.....	1
65 to 66.....	2 1/4	67 to 68.....	1
69 to 70.....	2 1/2	71 to 72.....	1
73 to 74.....	2 1/4	75 to 76.....	1
77 to 78.....	2 1/2	79 to 80.....	1
81 to 82.....	2 1/4	83 to 84.....	1
85 to 86.....	2 1/2	87 to 88.....	1
89 to 90.....	2 1/4	91 to 92.....	1
93 to 94.....	2 1/2	95 to 96.....	1
97 to 98.....	2 1/4	99 to 100.....	1
101 to 102.....	2 1/2	103 to 104.....	1
105 to 106.....	2 1/4	107 to 108.....	1
109 to 110.....	2 1/2	111 to 112.....	1
113 to 114.....	2 1/4	115 to 116.....	1
117 to 118.....	2 1/2	119 to 120.....	1
121 to 122.....	2 1/4	123 to 124.....	1
125 to 126.....	2 1/2	127 to 128.....	1
129 to 130.....	2 1/4	131 to 132.....	1
133 to 134.....	2 1/2	135 to 136.....	1
137 to 138.....	2 1/4	139 to 140.....	1
141 to 142.....	2 1/2	143 to 144.....	1
145 to 146.....	2 1/4	147 to 148.....	1
149 to 150.....	2 1/2	151 to 152.....	1
153 to 154.....	2 1/4	155 to 156.....	1
157 to 158.....	2 1/2	159 to 160.....	1
161 to 162.....	2 1/4	163 to 164.....	1
165 to 166.....	2 1/2	167 to 168.....	1
169 to 170.....	2 1/4	171 to 172.....	1
173 to 174.....	2 1/2	175 to 176.....	1
177 to 178.....	2 1/4	179 to 180.....	1
181 to 182.....	2 1/2	183 to 184.....	1
185 to 186.....	2 1/4	187 to 188.....	1
189 to 190.....	2 1/2	191 to 192.....	1
193 to 194.....	2 1/4	195 to 196.....	1
197 to 198.....	2 1/2	199 to 200.....	1
201 to 202.....	2 1/4	203 to 204.....	1
205 to 206.....	2 1/2	207 to 208.....	1
209 to 210.....	2 1/4	211 to 212.....	1
213 to 214.....	2 1/2	215 to 216.....	1
217 to 218.....	2 1/4	219 to 220.....	1
221 to 222.....	2 1/2	223 to 224.....	1
225 to 226.....	2 1/4	227 to 228.....	1
229 to 230.....	2 1/2	231 to 232.....	1
233 to 234.....	2 1/4	235 to 236.....	1
237 to 238.....	2 1/2	239 to 240.....	1
241 to 242.....	2 1/4	243 to 244.....	1
245 to 246.....	2 1/2	247 to 248.....	1
249 to 250.....	2 1/4	251 to 252.....	1
253 to 254.....	2 1/2	255 to 256.....	1
257 to 258.....	2 1/4	259 to 260.....	1
261 to 262.....	2 1/2	263 to 264.....	1
265 to 266.....	2 1/4	267 to 268.....	1
269 to 270.....	2 1/2	271 to 272.....	1
273 to 274.....	2 1/4	275 to 276.....	1
277 to 278.....	2 1/2	279 to 280.....	1
281 to 282.....	2 1/4	283 to 284.....	1
285 to 286.....	2 1/2	287 to 288.....	1
289 to 290.....	2 1/4	291 to 292.....	1
293 to 294.....	2 1/2	295 to 296.....	1
297 to 298.....	2 1/4	299 to 300.....	1
301 to 302.....	2 1/2	303 to 304.....	1
305 to 306.....	2 1/4	307 to 308.....	1
309 to 310.....	2 1/2	311 to 312.....	1
313 to 314.....	2 1/4	315 to 316.....	1
317 to 318.....	2 1/2	319 to 320.....	1
321 to 322.....	2 1/4	323 to 324.....	1
325 to 326.....	2 1/2	327 to 328.....	1
329 to 330.....	2 1/4	331 to 332.....	1
333 to 334.....	2 1/2	335 to 336.....	1
337 to 338.....	2 1/4	339 to 340.....	1
341 to 342.....	2 1/2	343 to 344.....	1
345 to 346.....	2 1/4	347 to 348.....	1
349 to 350.....	2 1/2	351 to 352.....	1
353 to 354.....	2 1/4	355 to 356.....	1
357 to 358.....	2 1/2	359 to 360.....	1
361 to 362.....	2 1/4	363 to 364.....	1
365 to 366.....	2 1/2	367 to 368.....	1
369 to 370.....	2 1/4	371 to 372.....	1
373 to 374.....	2 1/2	375 to 376.....	1
377 to 378.....	2 1/4	379 to 380.....	1
381 to 382.....	2 1/2	383 to 384.....	1
385 to 386.....	2 1/4	387 to 388.....	1
389 to 390.....	2 1/2	391 to 392.....	1
393 to 394.....	2 1/4	395 to 396.....	1
397 to 398.....	2 1/2	399 to 400.....	1
401 to 402.....	2 1/4	403 to 404.....	1
405 to 406.....	2 1/2	407 to 408.....	1
409 to 410.....	2 1/4	411 to 412.....	1
413 to 414.....	2 1/2	415 to 416.....	1
417 to 418.....	2 1/4	419 to 420.....	1
421 to 422.....	2 1/2	423 to 424.....	1
425 to 426.....	2 1/4	427 to 428.....	1
429 to 430.....	2 1/2	431 to 432.....	1
433 to 434.....	2 1/4	435 to 436.....	1
437 to 438.....	2 1/2	439 to 440.....	1
441 to 442.....	2 1/4	443 to 444.....	1
445 to 446.....	2 1/2	447 to 448.....	1
449 to 450.....	2 1/4	451 to 452.....	1
453 to 454.....	2 1/2	455 to 456.....	1
457 to 458.....	2 1/4	459 to 460.....	1
461 to 462.....	2 1/2	463 to 464.....	1
465 to 466.....	2 1/4	467 to 468.....	1
469 to 470.....	2 1/2	471 to 472.....	1
473 to 474.....	2 1/4	475 to 476.....	1
477 to 478.....	2 1/2	479 to 480.....	1
481 to 482.....	2 1/4	483 to 484.....	1
485 to 486.....	2 1/2	487 to 488.....	1
489 to 490.....	2 1/4	491 to 492.....	1
493 to 494.....	2 1/2	495 to 496.....	1
497 to 498.....	2 1/4	499 to 500.....	1
501 to 502.....	2 1/2	503 to 504.....	1
505 to 506.....	2 1/4	507 to 508.....	1
509 to 510.....	2 1/2	511 to 512.....	1
513 to 514.....	2 1/4	515 to 516.....	1
517 to 518.....	2 1/2	519 to 520.....	1
521 to 522.....	2 1/4	523 to 524.....	1
525 to 526.....	2 1/2	527 to 528.....	1
529 to 530.....	2 1/4	531 to 532.....	1
533 to 534.....	2 1/2	535 to 536.....	1
537 to 538.....	2 1/4	539 to 540.....	1
541 to 542.....	2 1/2	543 to 544.....	1
545 to 546.....	2 1/4	547 to 548.....	1
549 to 550.....	2 1/2	551 to 552.....	1
553 to 554.....	2 1/4	555 to 556.....	1
557 to 558.....	2 1/2	559 to 560.....	1
561 to 562.....	2 1/4	563 to 564.....	1
565 to 566.....	2 1/2	567 to 568.....	1
569 to 570.....	2 1/4	571 to 572.....	1
573 to 574.....	2 1/2	575 to 576.....	1
577 to 578.....	2 1/4	579 to 580.....	1
581 to 582.....	2 1/2	583 to 584.....	1
585 to 586.....	2 1/4	587 to 588.....	1
589 to 590.....	2 1/2	591 to 592.....	1
593 to 594.....	2 1/4	595 to 596.....	1
597 to 598.....	2 1/2	599 to 600.....	1
601 to 602.....	2 1/4	603 to 604.....	1
605 to 606.....	2 1/2	607 to 608.....	1
609 to 610.....	2 1/4	611 to 612.....	1
613 to 614.....	2 1/2	615 to 616.....	1
617 to 618.....	2 1/4	619 to 620.....	1
621 to 622.....	2 1/2	623 to 624.....	1
625 to 626.....	2 1/4	627 to 628.....	1
629 to 630.....	2 1/2	631 to 632.....	1
633 to 634.....	2 1/4	635 to 636.....	1
637 to 638.....	2 1/2	639 to 640.....	1
641 to 642.....	2 1/4	643 to 644.....	1
645 to 646.....	2 1/2	647 to 648.....	1
649 to 650.....	2 1/4	651 to 652.....	1
653 to 654.....	2 1/2	655 to 656.....	1
657 to 658.....	2 1/4	659 to 660.....	1
661 to 662.....	2 1/2	663 to 664.....	1
665 to 666.....	2 1/4	667 to 668.....	1
669 to 670.....	2 1/2	671 to 672.....	1
673 to 674.....	2 1/4	675 to 676.....	1
677 to 678.....	2 1/2	679 to 680.....	1
681 to 682.....	2 1/4	683 to 684.....	1
685 to 686.....	2 1/2	687 to 688.....	1
689 to 690.....	2 1/4	691 to 692.....	1
693 to 694.....	2 1/2	695 to 696.....	1
697 to 698.....	2 1/4	699 to 700.....	1
701 to 702.....	2 1/2	703 to 704.....	1
705 to 706.....	2 1/4	707 to 708.....	1
709 to 710.....	2 1/2	711 to 712.....	1
713 to 714.....	2 1/4	715 to 716.....	1
717 to 718.....	2 1/2	719 to 720.....	1
721 to 722.....	2 1/4	723 to 724.....	1
725 to 726.....	2 1/2	727 to 728.....	1
729 to 730.....	2 1/4	731 to 732.....	1
733 to 734.....	2 1/2	735 to 736.....	1
737 to 738.....	2 1/4	739 to 740.....	1
741 to 742.....	2 1/2	743 to 744.....	1
745 to 746.....	2 1/4	747 to 748.....	1
749 to 750.....	2 1/2	751 to 752.....	1
753 to 754.....	2 1/4	755 to 756.....	1
757 to 758.....	2 1/2	759 to 760.....	1
761 to 762.....	2 1/4	763 to 764.....	1
765 to 766.....	2 1/2	767 to 768.....	1
769 to 770.....	2 1/4	771 to 772.....	1
773 to 774.....	2 1/2	775 to 776.....	1
777 to 778.....	2 1/4	779 to 780.....	1
781 to 782.....	2 1/2	783 to 784.....	1
785 to 786.....	2 1/4	787 to 788.....	1
789 to 790.....	2 1/2	791 to 792.....	1
793 to 794.....	2 1/4	795 to 796.....	1
797 to 798.....	2 1/2	799 to 800.....	1
801 to 802.....	2 1/4	803 to 804.....	1
805 to 806.....	2 1/2	807 to 808.....	1
809 to 810.....	2 1/4	811 to 812.....	1
813 to 814.....	2 1/2	815 to 816.....	1
817 to 818.....	2 1/4	819 to 820.....	1
821 to 822.....	2 1/2	823 to 824.....	1
825 to 826.....	2 1/4	827 to 828.....	1
829 to 830.....	2 1/2	831 to 832.....	1
833 to 834.....	2 1/4	835 to 836.....	1
837 to 838.....	2 1/2	839 to 840.....	1
841 to 842.....	2 1/4	843 to 844.....	1
845 to 846.....	2 1/2	847 to 848.....	1
849 to 850.....	2 1/4	851 to 852.....	1
853 to 854.....	2 1/2	855 to 856.....	1
857 to 858.....	2 1/4	859 to 860.....	1
861 to 862.....	2 1/2	863 to 864.....	1
865 to 866.....	2 1/4	867 to 868.....	1
869 to 870.....	2 1/2	871 to 872.....	1
873 to 874.....	2 1/4	875 to 876.....	1
877 to 878.....	2 1/2	879 to 880.....	1
881 to 882.....	2 1/4	883 to 884.....	1
885 to 886.....	2 1/2	887 to 888.....	1
889 to 890.....	2 1/4	891 to 892.....	1
893 to 894.....	2 1/2	895 to 896.....	1
897 to 898.....	2 1/4	899 to 900.....	1
901 to 902.....	2 1/2	903 to 904.....	1
905 to 906.....	2 1/4	907 to 908.....	1
909 to 910.....	2 1/2	911 to 912.....	1
913 to 914.....	2 1/4	915 to 916.....	1
917 to 918.....	2 1/2	919 to 920.....	1
921 to 922.....	2 1/4	923 to 924.....	1
925 to 926.....	2 1/2	927 to 928.....	1
929 to 930.....	2 1/4	931 to 932.....	1
933 to 934.....	2 1/2	935 to 936.....	1
937 to 938.....	2 1/4	939 to 940.....	1
941 to 942.....	2 1/2	943 to 944.....	1



## TO ALL WHO USE STEAM-POWER!

We will put our Governor on any Engine, and guarantee it to prove itself superior to all others.  
If, after a fair trial, it does not, we will take it off at our own expense.

**Shive Governor Co.**  
BETHLEHEM, PA.

ALSO,  
**SHIVE'S PATENT WATCHMAN'S CLOCK AND DETECTOR,**

AND  
**Buoy's Patent Counter Scale,**  
No Nest of Weights.

Circulars sent free

## THE JUDSON GOVERNOR.

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacks durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.



THE JUDSON PATENT Improved Steam Governor.

No Charge for Boxing & Cartage.

**JUNIUS JUDSON & SON, Rochester, N. Y.**

## Reduced Price List,

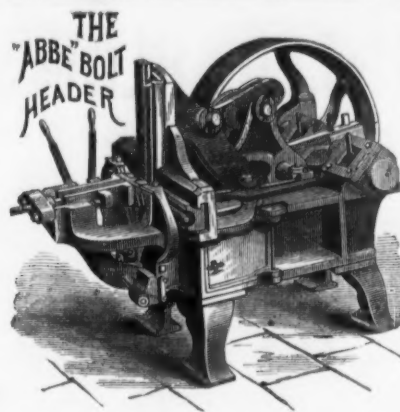
JANUARY 25th, 1876.

For dimensions of Governor, see Illustrated Price List.

Size, Inch.	Plain.	Bright For-shed.	Extra for Lever.	Stop Valve.
1 1/2	\$17.00	\$19.00	\$1.00	..
1 3/4	19.00	21.00	1.00	..
2	21.00	23.00	1.00	..
2 1/4	25.00	28.00	1.00	6.00
2 1/2	29.00	33.00	1.00	8.00
2 3/4	35.00	40.00	1.00	10.00
3	42.00	48.00	1.00	14.00
3 1/4	45.00	51.00	1.00	15.00
3 1/2	49.00	56.00	1.00	17.00
3 3/4	55.00	63.00	1.00	20.00
4	64.00	73.00	1.00	25.00
4 1/4	74.00	84.00	1.00	30.00
4 1/2	86.00	97.00	1.00	36.00
4 3/4	94.00	108.00	1.00	42.00
5	113.00	125.00	1.00	48.00
5 1/4	135.00	148.00	1.00	54.00
5 1/2	150.00	165.00	1.00	68.00
5 3/4	185.00	202.00	1.00	80.00
6	205.00	225.00	1.00	..



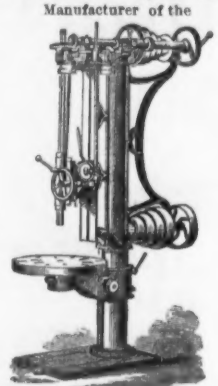
THE PALMER POWER SPRING HAMMER.



Of these Machines we are building sizes to meet the requirements of all Manufacturers and Workers of Iron and Steel. In simplicity, durability, ease of operation, accuracy, and range of work, we guarantee them superior to any Machines of their kind produced in the world. For prices, references, and full descriptive circulars, address

**S. C. FORSAITH & CO.,**  
Manchester, N. H.

**P. BLAISDELL & CO.,**  
WORCESTER, MASS.,  
Manufacturers of the



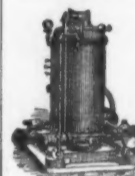
"BLAISDELL" UPRIGHT DRILLS  
And other First-Class Machinists' Tools.

**AMERICAN NATURAL OIL CO.**

DEALERS IN ALL KINDS OF

**Lubricating Oils.**

West Virginia Lubricating Native Rock Oil Used by most of the Railroads in the United States, Canada and Europe, and by Mechanics on all kinds of Machinery. The Safest, Cheapest and Most Reliable Lubricator in the world. Obtained the High Prize at the Paris Exposition. 25, 29, 30 and 31 Gravity. No. 25 CEDAR STREET, NEW YORK.



**The Whitmore Engine.**  
SAFEST, CHEAPEST & BEST.

**Lovegrove & Co.,**  
No. 121 South Fourth Street,  
PHILADELPHIA, PA.  
Sole Manufacturers  
Engines, Boilers and  
Steam Pumps.

## The Almond Drill Chuck

THE BEST DRILL CHUCK IN THE MARKET.



Is Simple in Construction, Self-Centering and very Strong.

Will hold, with a perfectly tight grip, from 5-16 to 0, and weighs but 12 oz.

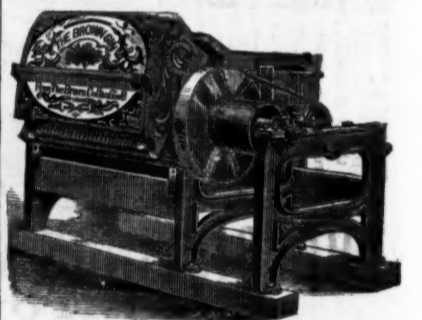
Price, \$5.00 each.  
Liberal discounts to the trade.

AGENTS,

**FRASSE & CO., 62 Chatham St. N.Y.**

**OHL & HAUSCHILD,**  
Engineers & Machinists  
And manufacturers of

Lathes, Shapers, Slotters, Planers, Gear Cutters, Drill and Power Presses, Pulleys, Hangers and Shafts, Machinery and Machinists' Tools in general.  
57, 59 & 61 Passaic Avenue,  
Kearney (East Newark), N. J.



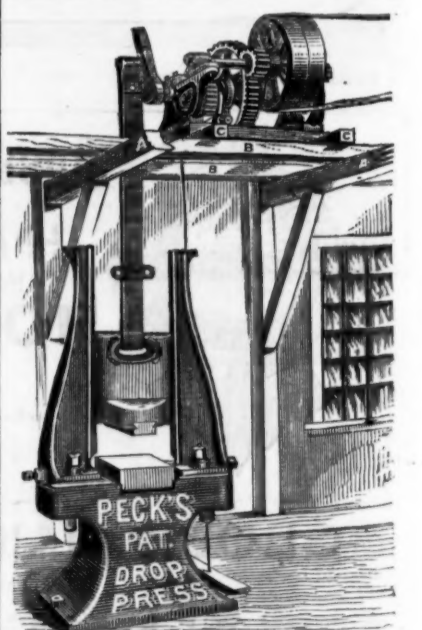
**The Brown Cotton Gin Co.**

NEW LONDON, CONN.

Manufacturers of  
**COTTON GINS,**

With or without

Self-Feeding Attachment & Condenser.  
Cotton Gin Saws, Ribs and other Gin materials. Also  
Albertson's Segment Screw Cotton, and Hay  
Press. Send for Circular.



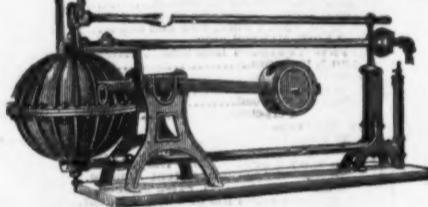
I have the largest and best stock of Drop Press Patterns in the country—suitable for Forging, and all kinds of Sheet Metal work.

WHY THE BEST:

It requires less power, works faster, gives a harder blow with same weight of hammer, the rebound of the hammer is caught without lessening the force of the blow, the blow is uniform and not affected by variations in the speed of the driver. It is always in order. The Drop Press a specialty.

**MILO PECK, New Haven, Conn.**

## The Albany Steam Trap.



This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

**Albany Steam Trap Company,**  
Albany, N. Y.

**The Pratt & Whitney Co.,**  
Hartford, Conn.,  
Have constantly on hand and making



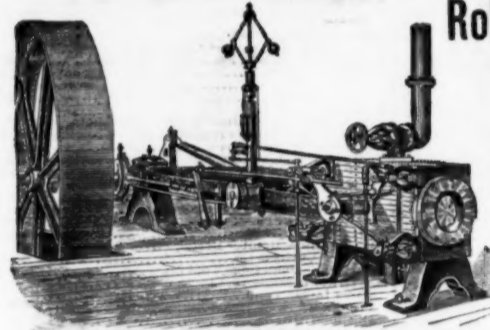
## Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.

**Robt. Wetherill & Co**  
CHESTER, PA.

**Corliss Engine BUILDERS.**

Shafting & Gearing,  
Boiler Makers.

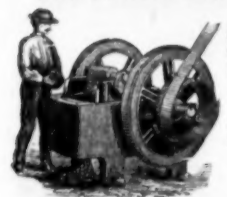


**THORNE, DeHAVEN & CO., Drilling Machines,**  
21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction.  
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.  
VERTICAL DRILLS. Self-feeding.  
MULTIPLE DRILLS. 2 to 30 Spindles.  
HORIZONTAL BORING AND DRILLING MACHINES.  
HAND DRILLS. CAR BOX DRILLS.  
SPECIAL DRILLS. For Special Work.

## BLAKE'S PATENT STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect McADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS. It is extensively in use in MINING operations, for crushing

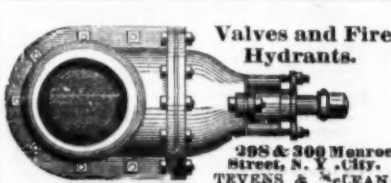
IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.

Also for crushing Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barytes, Manganese, Phosphate Rock, Plaster, Soapstone, &c.  
For Illustrated Circulars, and particulars, address.

**BLAKE CRUSHER CO., New Haven, Conn.**



**Stevens & McLean**  
298 & 300 Monroe St.,  
New York,  
AGENTS.



Valves and Fire Hydrants.

298 & 300 Monroe Street, N. Y. City.  
STEVENS & McLEAN.

## Knowles Patent Steam Pumps

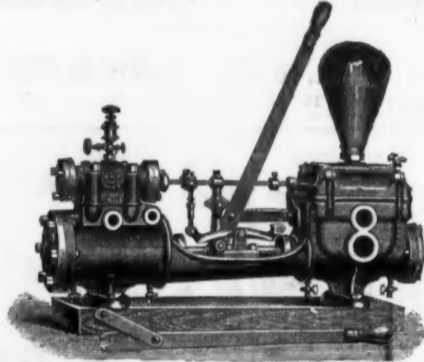
MANUFACTURED BY THE

**KNOWLES STEAM PUMP WORKS,**  
WARREN, MASS.

WAREHOUSES:

14 & 16 Federal Street, Boston,

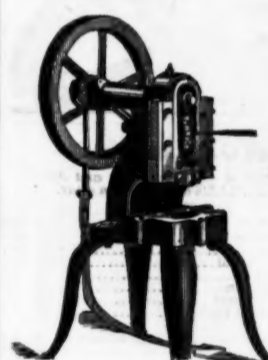
92 & 94 Liberty Street, N. Y.



Cut above represents regular Boiler Feed Pump, No. 3 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

## FIRE PUMPS a specialty.

Mining Pumps (both Double Acting Plunger, and Piston Pattern), which we guarantee to run absolutely noiseless on any lift from 100 to 600 ft., at a single lift, a specialty. Pumps for every possible duty. Prices as low as any, and our workmanship and material altogether the Best.  
Every machine furnished under a complete guarantee.



**A. H. MERRIMAN,**  
Patent Power  
**Punching Presses.**

Patentee and Sole Manufacturer.

I warrant every part of this Machine to stand the shock of the wheel running at 135 revolutions.

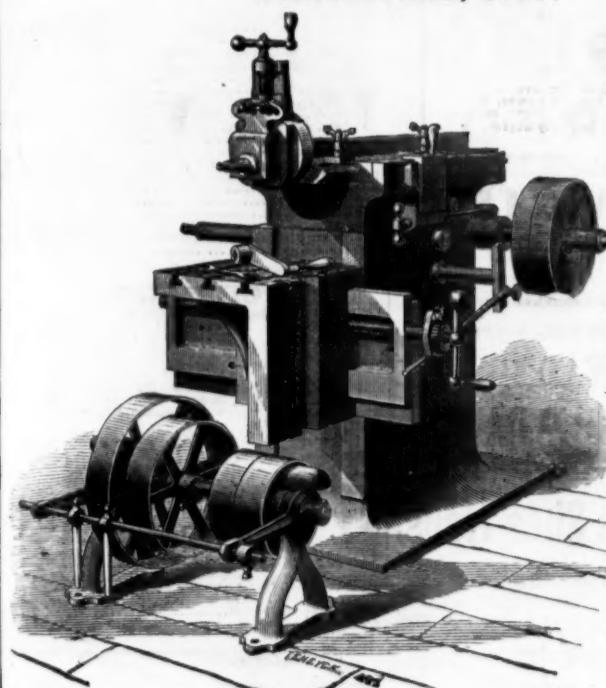
West Meriden, Conn.

Machinery Hall, Philadelphia, Section B 4, Columns 28 and 29.

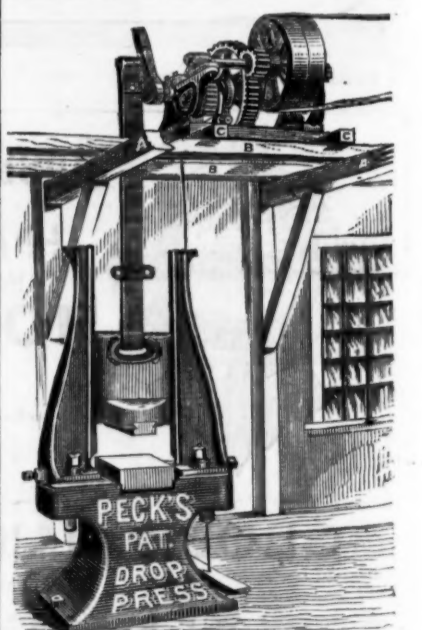
## THE HENDEY MACHINE CO.

MANUFACTURERS OF

**THE MANVILLE**  
Patent Planers and Shaping Machines.  
WOLCOTTVILLE, CONN.



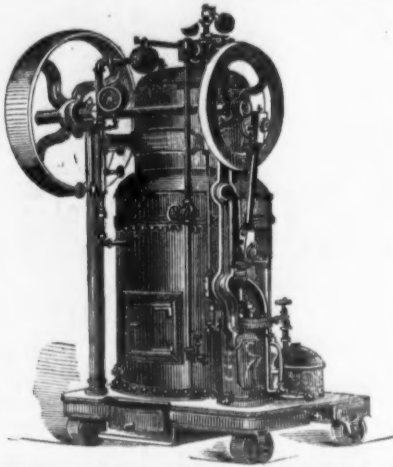
Any length of stroke from 3/4 to 24 inch in length, while machine is running with perfect uniformity of speed of cutting tool. Automatic cross feed of 19 inch and 16 inch, from top of table to bottom of slide when table is down. Send for Circular and Price List.



## Machinery, &amp;c.

THE  
Shapley Engine

Patented Feb. 10, 1874.

COMPACT,  
PRACTICAL,  
DURABLE,  
ECONOMICAL.  
\$200.00.Cheaper than any Engine offered of  
the same capacity.MANUFACTURED BY  
**SHAPLEY & WELLS,**  
Binghamton Iron Works,  
Binghamton, N. Y.Manufacturers of Steam Engines, Rollers, Water Wheels, Circular Saw Mills and  
Mill Work generally.**BUSH HILL IRON WORKS,**Corner 16th & Buttonwood Streets  
PHILADELPHIA.**JAMES MOORE,**

(Successor to MATTHEWS &amp; MOORE.)

Engineer, Machinist, Founder and Boilermaker

CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or  
Composition Metals.Sugar Mill, Saw Mill and Grist Mill Machinery,  
AND MILLWRIGHTING IN GENERAL.BOILERS—FLUE, TUBULAR AND CYLINDER, and all kinds of  
TANK AND PLATE IRON WORK.

## Machinery, &amp;c.

Established 1848.

**WM. SELLERS & CO.,**

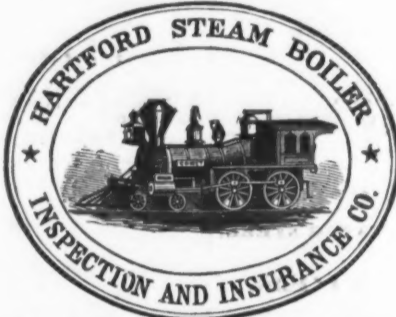
1600 Hamilton Street, PHILADELPHIA.,

Engineers, Iron Founders and Machinists.

RAILWAY SHOP EQUIPMENTS.

Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters  
Are of Improved and Patented Construction.Railway Turning and Transfer Tables,  
SHAFTING & MILL GEARING, a specialty.**Pivot Bridges.**

GIFFARD'S INJECTOR--IMPROVED, SELF-ADJUSTING.



Issues Policies of Insurance after a careful inspection of the Boilers

COVERING ALL LOSS OR DAMAGE TO

**Boilers, Buildings and Machinery,**

ARISING FROM

**STEAM BOILER EXPLOSIONS.**

The Business of the Company includes all kinds of STEAM BOILERS

Full information concerning the plan of the Company's operations can be obtained at the

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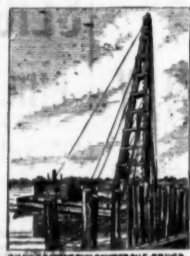
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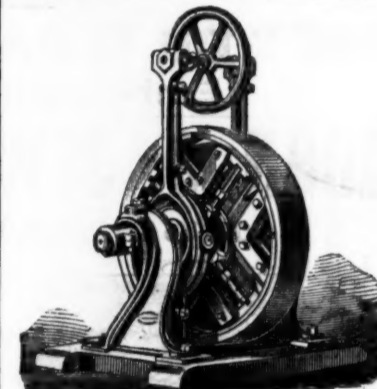
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